AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

NOVEMBER 15, 1950

In This Issue . . .

Ford Overhead Valve Engines

Paris International Automobile Show

Powdered Iron Blades for Gas Turbines

Budd's New Brake Drum Foundry

Our Supplies of Non-Ferrous Metals

Complete Table of Contents, Page 3

A CHILTON PUBLICATION

GUARDED 3 ways!

Heald guarding saves time – saves effort – saves maintenance

Each machine shipped from the Heald factory is *triply guarded* – for safety, convenience, and maximum efficiency of operation.

Proper machine guarding is more than just a matter of meeting safety requirements – or J.I.C. standards. It means guarding against *extra costs*, too! And the guards and covers for every Heald machine are especially designed with this in mind.

You don't have to install special guards for your own particular tooling set-up. That's all taken care of for you. You can let the chips fall where they may, without danger of fouling the table ways or piling up under bridges. Coolant is carefully controlled, too – with guards designed to prevent spattering on the floor or operator. And dust and dirt – perennial enemies of precision equipment – can't harm the working parts or electrical controls.

In short, Heald's extra precautions in guarding add up to extra savings for you – in reduced maintenance, easier operation, and sustained production efficiency.

Remember – when it comes to precision finishing, it pays to come to Heald.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

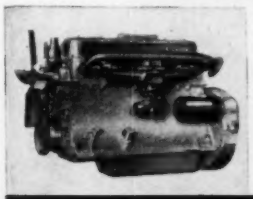
HEALD

Branch Offices Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

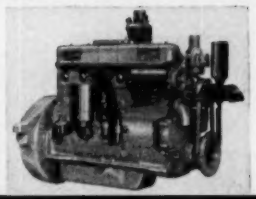
265 cu. in. to 3520 cu. in.

GASOLINE • DIESEL

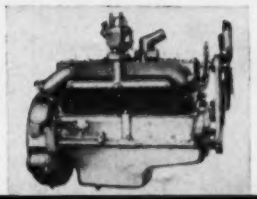
WAUKESHA ENGINES



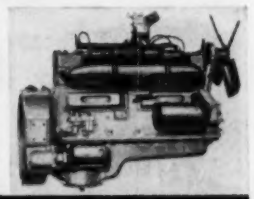
265 cu. in. Gasoline



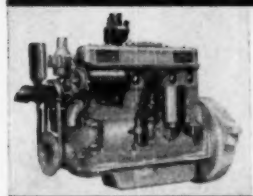
320 cu. in. Gasoline



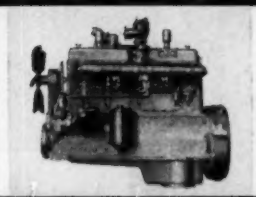
320 cu. in. Gasoline



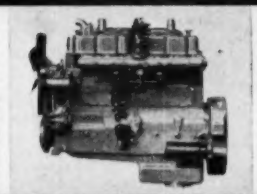
404 cu. in. Gasoline



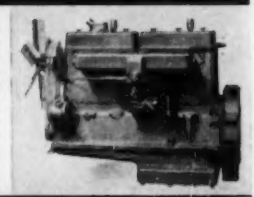
426 cu. in. Gasoline 451 cu. in.



525 cu. in. Gasoline 554 cu. in.



779 cu. in. Gasoline 817 cu. in.



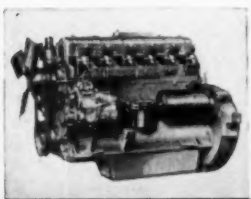
1197 cu. in. Butane

DEPENDABLE POWER for

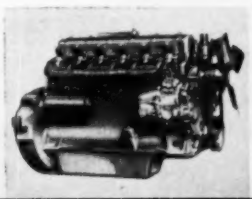
Trucks • Buses • Tractors • Fire Trucks
Rescue Squad Cars • Airport Crash Trucks
Package Delivery Cars • Off-Highway Tractors
Pumps • Electrical Machinery
Oil Fields • Industrial Equipment
Mining • Earth Moving Equipment
. . . and many other heavy-duty requirements

Send for DESCRIPTIVE BULLETINS on any or all of these engines or consult Waukesha Engineers on your power needs.

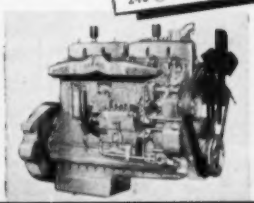
Max. HP and RPM	Cylinders	Bore and Stroke, In.	Displ. Cu. In.
GASOLINE ENGINES			
66 @ 2400	6	3¾ x 4	265
122 @ 3000	6	4⅛ x 4	320
104 @ 3000	6	4 x 4½	404
128 @ 2800	6	4½ x 4¾	426
141 @ 2800	6	4½ x 5	451
150 @ 2800	6	4⅝ x 5	525
172 @ 2600	6	4½ x 5⅛	554
188 @ 2600	6	4⅝ x 5½	779
224 @ 2100	6	5¼ x 6	817
221 @ 2000	6	5⅛ x 6	1197
*300 @ 1800	6	6¾ x 6½	
*Butane engine			
DIESEL ENGINES			
88 @ 2400	6	3¾ x 4	265
119 @ 2800	6	4 x 5	377
136 @ 2800	6	4½ x 5	426
173 @ 1900	6	5½ x 6	779
240 @ 1800	6	6¼ x 6½	1197



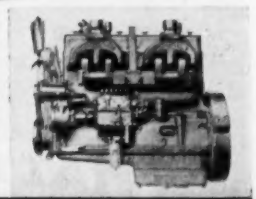
265 cu. in. Diesel



377 cu. in. Diesel 426 cu. in.

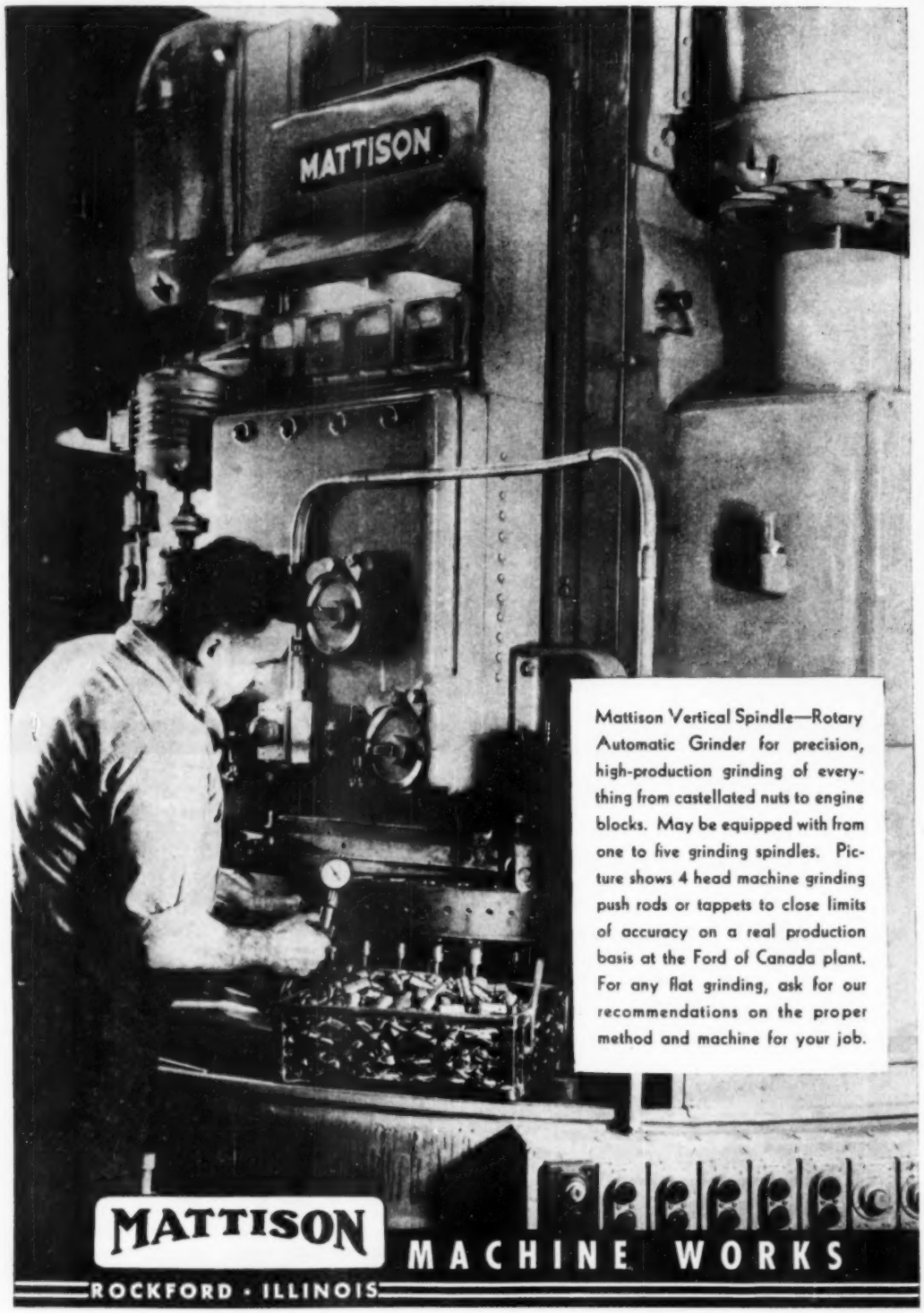


779 cu. in. Diesel



1197 cu. in. Diesel

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., NEW YORK, TULSA, LOS ANGELES



Mattison Vertical Spindle—Rotary Automatic Grinder for precision, high-production grinding of everything from castellated nuts to engine blocks. May be equipped with from one to five grinding spindles. Picture shows 4 head machine grinding push rods or tappets to close limits of accuracy on a real production basis at the Ford of Canada plant. For any flat grinding, ask for our recommendations on the proper method and machine for your job.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

Nov. 15, 1950 Vol. 103, No. 10

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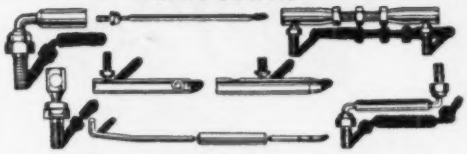
AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

TOUREK

BALL JOINTS, PIPE PLUGS AND QUALITY SCREW MACHINE PRODUCTS

BALL JOINTS



Tourek's quality Ball Joints meet exacting requirements. Simplified design, improved performance, and lower costs result from specifying Tourek Ball Joints... the only recognized standard. Large stocks assure prompt delivery.

PIPE PLUGS

Tourek's precision countersunk steel pipe plugs are accurate, high strength, and economical—resulting in the highest quality at costs which are competitive to old style plugs.

Stock sizes, available with National Pipe or Dry-Seal threads are: ¼", ⅜", ½", ¾" and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 2⅜" diameter.

SCREW MACHINE PRODUCTS

Modern high-speed single and 6-spindle automatics—together with complete secondary equipment, including grinding and brazing—plus 30 years' experience, assure you "The Best in Quality Screw Machine Products."

Your requirements, up to 2⅜", are made with utmost precision, and with promptest delivery assurances.

LITERATURE—Comprehensive data on any or all Tourek products sent promptly upon request. Write for yours now. J. J. TOUREK MFG. CO., 4701 West 16th St., Chicago 50, Illinois.

TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"

ESTABLISHED IN 1920

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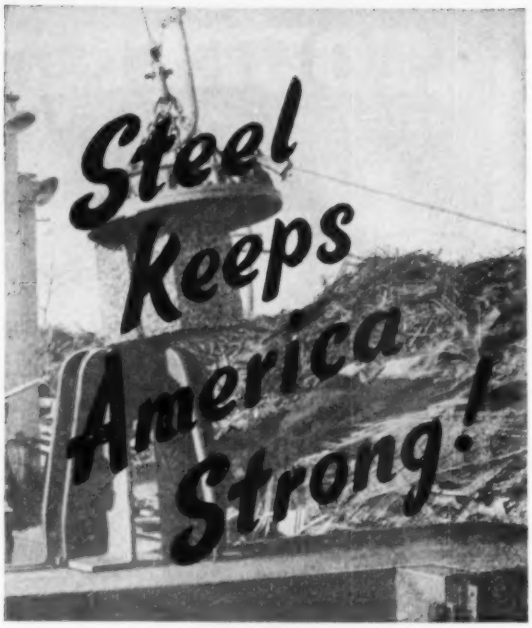
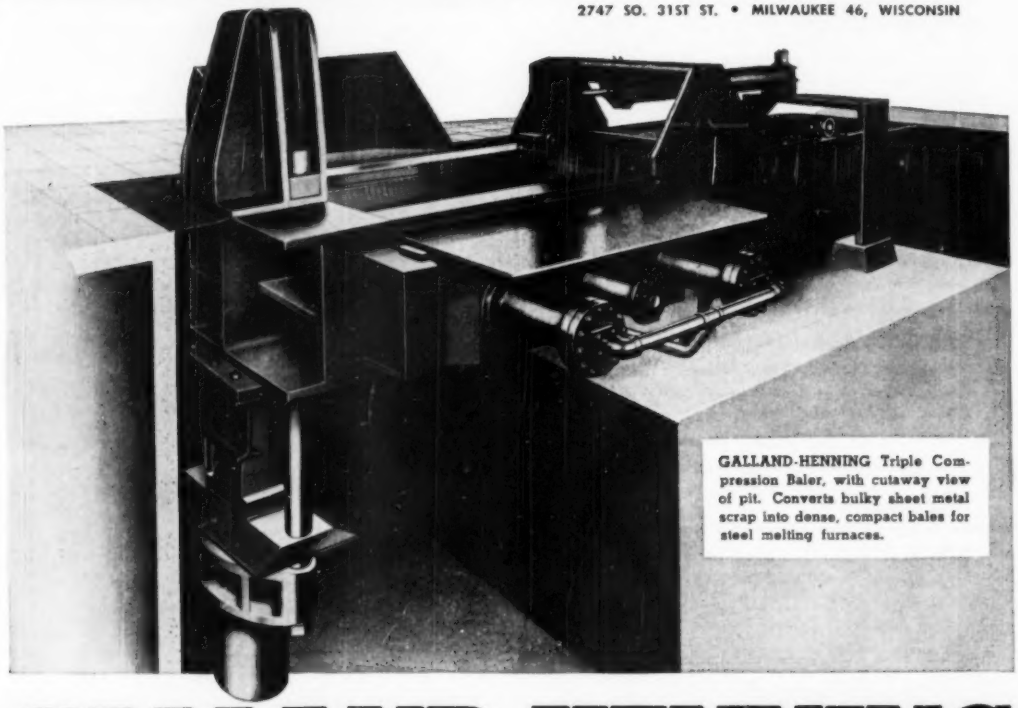


. . . and Baled Sheet Metal Scrap Helps Keep Steel Production at a High Level

If you are not baling your sheet metal scrap, perhaps you should be . . . not only for the immediate benefit to your own operation . . . but in the interest of a strong industrial economy. More and more steel is needed for its continued strength and growth.

If you question the advisability of baling your sheet metal scrap, competent counsel is available without cost or obligation. Galland-Henning engineers offer you the benefit of many years' experience in all types of scrap metal baling . . . and in the design, construction and installation of powerful, efficient baling equipment which assures lowest possible cost-per-ton.

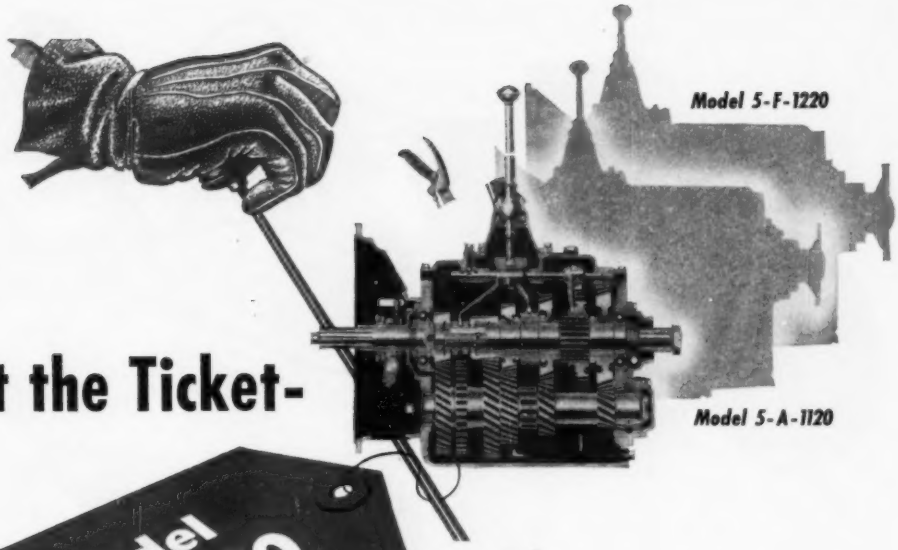
GALLAND-HENNING MFG. CO.
2747 SO. 31ST ST. • MILWAUKEE 46, WISCONSIN



GALLAND-HENNING Triple Compression Baler, with cutaway view of pit. Converts bulky sheet metal scrap into dense, compact bales for steel melting furnaces.

GALLAND-HENNING
SCRAP METAL BALING PRESSES

A 5840-1P



Just the Ticket-

for your 150-200 HP DIESELS!

This new heavy-duty Fuller Transmission, the model 5-C-720, completes the Fuller coverage of 150 to 400 hp gas or diesel engines. All three of these five-speeds feature *all-helical gearing* to permit compact design—plus:

- ***Shorter, easier shifts***
- ***Quiet operation***
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- ***Low weight—high capacity***

Write now for engineering details.

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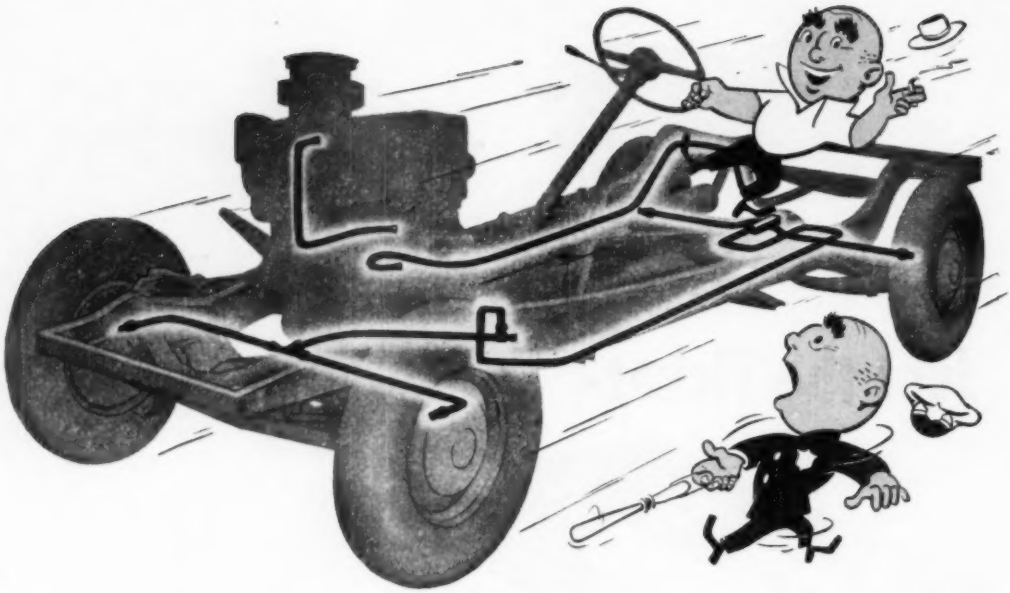

The finest lines on any car...

BUNDYWELD TUBING

OIL LINES, fuel lines and hydraulic brake lines *are* the finest lines on any car when they're of durable, double-walled Bundyweld.

Automotive engineers know this, too; witness the fact they specify it *on an average of 20 times per automobile.*

Why Bundyweld? Bundyweld has more automotive advantages than any other tubing, thanks to its exclusive double-walled construction. Lightweight and ductile, it's copper-bonded throughout—an extra-strong tubing that's easy to bend, yet stands up under severest strain and shock. It's leakproof, too, helps make safety a sure thing. These features are reasons why you'll find Bundyweld in the hydraulic brake line systems of 95% of today's cars!

A lot of cars? Sure, and a lot of good tubing, too. Bundy is geared to producing tubing at the rate of 3000 feet per minute, as much as 500,000,000 feet per year. Bending machines, exclusive in the industry, turn out completely fabricated pieces. Each piece is thoroughly inspected *right on the job,* and finished to your exact specifications. In any tubing application, Bundyweld means less rejects, increased production, better finished product.

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

Find out more about amazing Bundyweld. Contact a listed distributor, or write: *Bundy Tubing Company, Detroit 14, Michigan.*

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

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Bundyweld . . . double-walled and brazed through 360° of wall contact.

SIZES UP TO 5/8" O.D.

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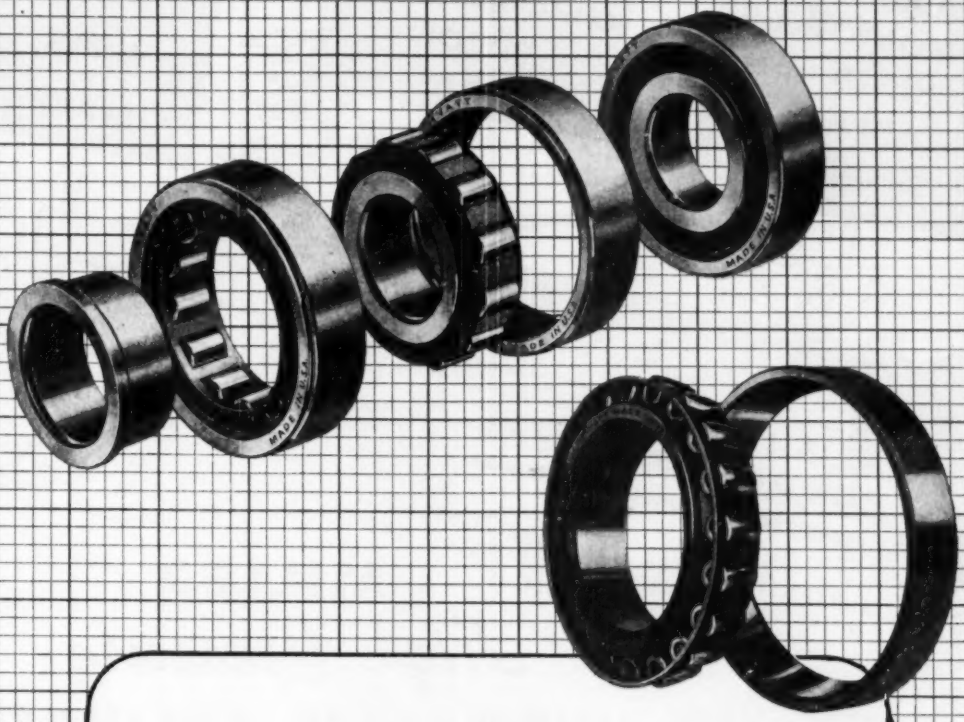

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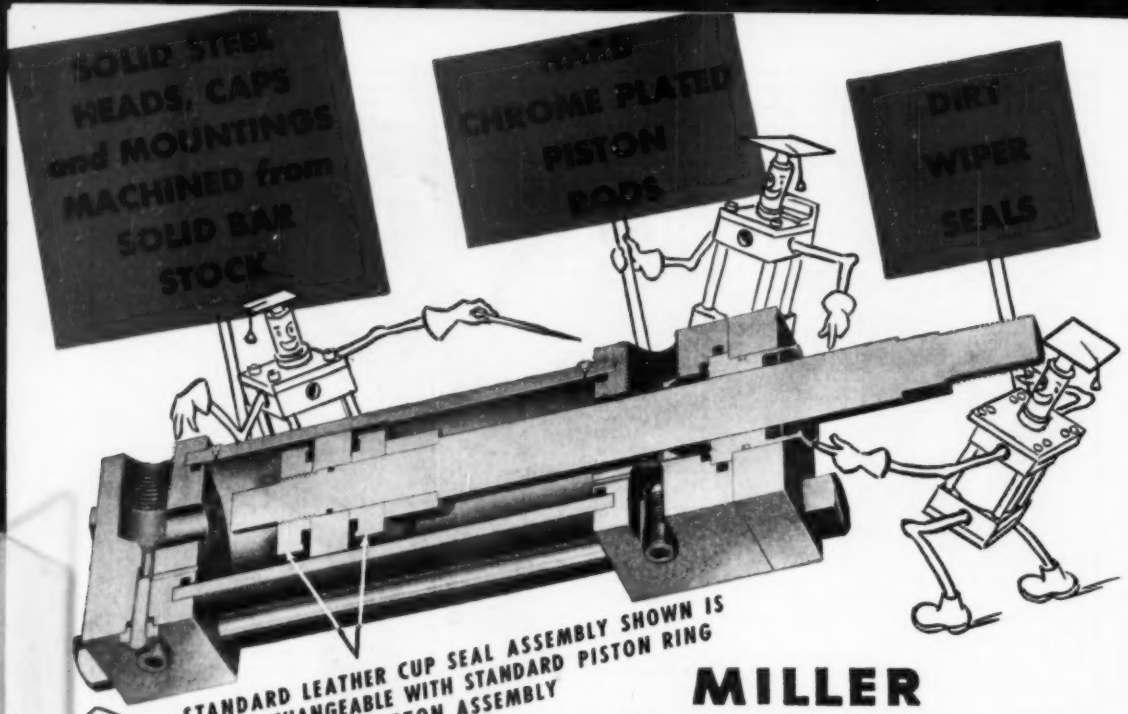
Naturally, since Hyatt Roller Bearings are so universally used in the automotive industry, Hyatt has acquired a vast amount of engineering knowledge in this specific field.

So if you have a special bearing engineering problem that's puzzling you, then Hyatt Engineering Service may be called into consultation.

Hyatt makes such a wide range of types and sizes of roller bearings suitable for cars, trucks, and buses that you should have no difficulty in finding just the right Hyatts for almost every position. Make use of Hyatt's long experience, write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Detroit, Michigan.

HYATT ROLLER BEARINGS



STANDARD LEATHER CUP SEAL ASSEMBLY SHOWN IS INTERCHANGEABLE WITH STANDARD PISTON RING PISTON ASSEMBLY

MILLER *High Pressure* HYDRAULIC CYLINDERS

Meet J. I. C. HYDRAULIC STANDARDS

Benefits to You

- No Broken Castings
- No Scratch-Damage to Piston Rods, Bushings and Seals
- NO COSTLY "DOWNTIME"
- NO REPAIRS
- NO MAINTENANCE
- NO POWER WASTAGE

Years before the Joint Industry Conference (J. I. C.) Standards for specifying "quality" hydraulic equipment were adopted, the *standard* design and construction features of Miller High Pressure Hydraulic (2000-3500 psi) Cylinders already included ALL the specifications for cylinders, seals and pistons now called for by the "Standards". Hard chrome plated, scratch-resistant piston rods and dirt wipers have long been standard Miller cylinder features yet are required by the "Standards" only under severe conditions.

Solid steel heads, caps and mountings which eliminate costly, dangerous breakage even under the severest operating conditions represent an "extra-quality" standard Miller cylinder feature which actually exceeds the high quality set by the J. I. C. Standards.

The Miller "Patented" Hydraulic Piston Rod Seal which has no manual adjustment and is automatically self-adjusting and wear-compensating to give life-long leakproof service without ever requiring any manual adjustment whatsoever . . . far surpasses the requirement of J. I. C. Standard H6.2.5 which specifies "Stuffing boxes for automatic packing shall be so designed as to prevent adjustment beyond the functional limits of the packing"

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY

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AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · BOOSTERS · AIR HOISTS

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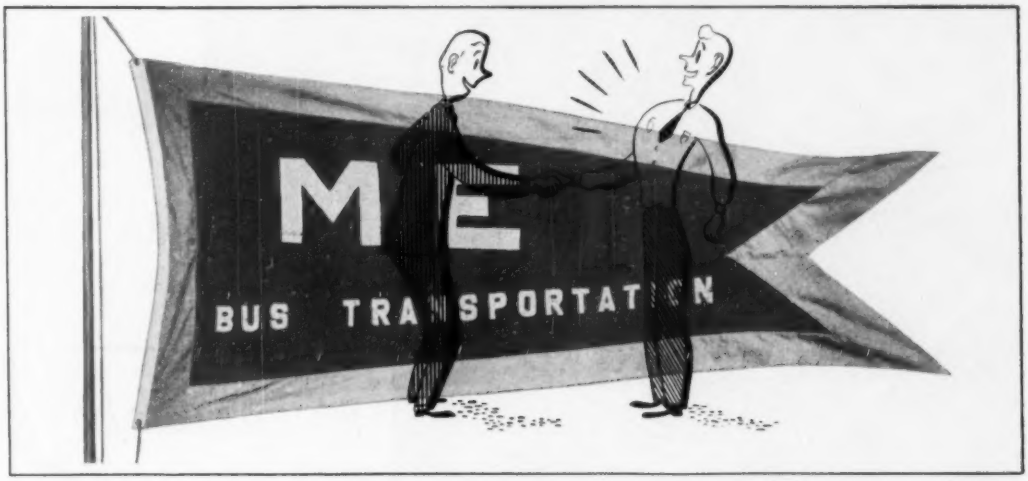
ST. LOUIS and OTHER AREAS.

Sales and Service from coast to coast

Ross Congratulates

The 1950 Winners of the Annual Bus Transportation Maintenance Awards

For a job WELL DONE



AGAIN . . . Ross Steering is *predominant* among the winners of Bus Transportation's Annual Maintenance Awards. Whatever the steering job may be . . . buses, trucks, passenger cars, boats, tractors, shovels, cranes, graders, etc. . . . *Ross assures ease, safety and economy.*

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

Throughout 43 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

***Cam & Lever* STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

whatever your job for synthetic rubber

In hundreds of industries, users of Acadia Synthetic Rubber component parts have found them unsurpassed. So, no matter what function synthetic rubber must perform in your plant, depend on Acadia parts. They best meet exacting specifications and operating conditions such as moisture, oil, heat, wear and age resistance. Molded, extruded, die-cut to close limits – compounded to meet specific conditions. Acadia engineers will gladly cooperate.

• Seals • Gaskets • Washers • Cups • Channel • Strip • "O" Rings
• Sheet • Tubing • Roll Goods • Cut Parts • Lathe Cut Washers

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N-A-X HIGH FATIGUE RESISTANCE

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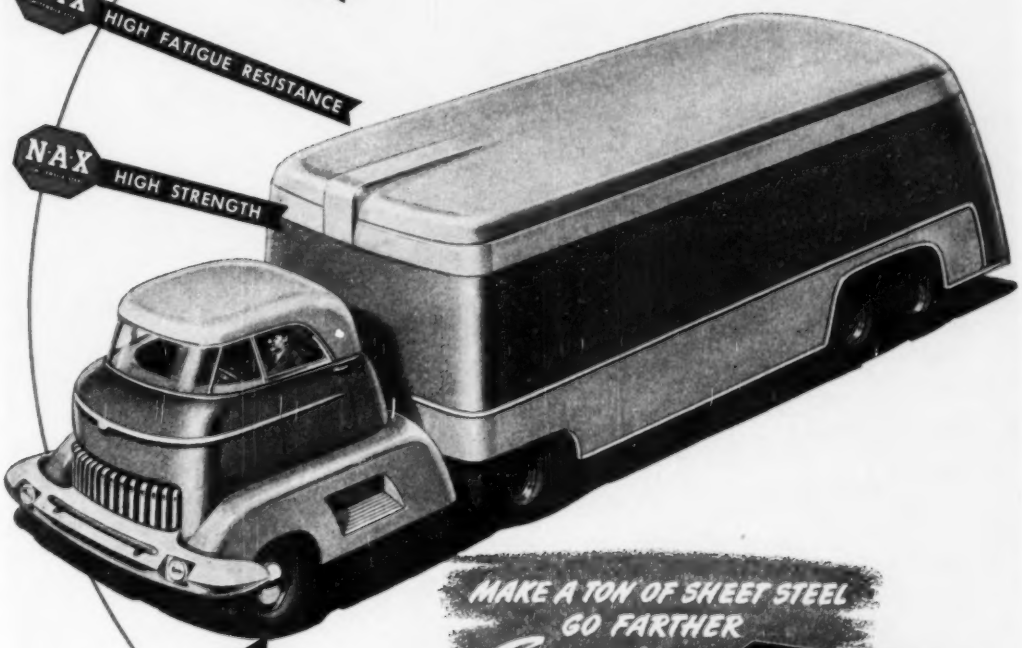

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Fresh-Air Heating, Ventilating, and De-Frosting Systems Achieve a New High in Motor Car and Truck-Cab Comfort, Safety, and Driver Health

Manufactured in the country's largest, most modern plant devoted exclusively to automobile heater production. Engineered for, and sold exclusively to car and truck manufacturers.

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EATON PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER DEFROSTER UNITS • SNAP RINGS • SPRINGTITES SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

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GENERAL DUTY SLITTING LINES

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AT LOW INITIAL COSTS

PLUS FEATURES THAT ENABLE YOU TO

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IF you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration. Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

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Equipment Corporation

CLEVELAND, OHIO

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CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

HYDROVAC

THE POWER BRAKE PREFERRED ABOVE ALL OTHERS!

More than two million installations are certainly undeniable proof of any product's popularity. In the field of power braking it means that one —the Bendix Hydrovac—is preferred above *all* others. Such overwhelming acceptance by the men who service, drive and own the nation's trucks is impressive enough in itself. It further suggests, however, that Hydrovac* power braking might very profitably be included as original equipment by most manufacturers. If you are interested in taking advantage of this great pre-sold market, write the factory direct for details on Hydrovac—the undisputed leader in power braking.

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DIVISION of
SOUTH BEND 20, INDIANA
AVIATION CORPORATION

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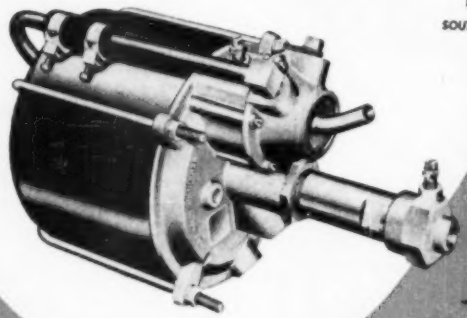

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OF THE BASICS
OF BETTER
MOTOR VEHICLES

Bendix® Automatic Clutch and Gear Shift Control Systems

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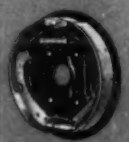

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AUTOMOTIVE INDUSTRIES

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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

★ **500 Brake Drums Per Hour at Budd's**

Budd Co. has placed in operation a modern $1.5 million foundry on 22 acres of ground in northeast Philadelphia adjacent the Red Lion Plant, designed to better serve the eastern plants of its automotive customers. How, with one production line, the foundry is presently turning out 500 automobile brake drums per hour, is told in the story, page 32.

★ **The London and Paris Automobile Shows**

At the 35th London Show in October Ford introduced two new models having valve-in-head "square" engines. At the 1950 Paris Show seven countries were represented, making it the most international of the European exhibitions. For complete coverage of these two events, refer to pages 34 and 42 respectively.

★ **Large Scale Buying at the Metal Show**

For the amount of equipment sold right off the floor, the 32nd National Metal Congress and Exposition held at Chicago in October is said to have probably surpassed any previous event of its kind. This interesting Metal Show Review also includes abstracts of papers presented at ASM technical sessions. Page 38.

★ **Powdered Iron Blades for Gas Turbines**

Seven different and basic methods are in production at Thompson Products, Inc., for the manufacture of intricate turbine blades and vanes. The article describes a special technique with powdered iron requiring minimum machining, yet holding a close tolerance and uniform surface finish. Page 40.

★ **Chemical Products and Automobiles**

Here is given a table of 256 chemical products—from abrasives to zirconium—upon which the automobile industry directly or indirectly depends. The article shows how inextricably the chemical aspects of fuels, engine deposits, lubricant additives, automatic transmissions, metals, rubber, plastics, finishes, plating, glass and fabrics are bound up with automobile production. Page 46.

★ **21 New Product Items And Other High Spots, Such As:**

Style changes in Lincolns for 1951; blast cleaning of forgings to reduce stream pollution; vehicle registrations that are passing 48 million; and important facts about our supplies of non-ferrous metals.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

(Advertisement)

RYERSON STEELGRAMS

This bulletin is written to keep you abreast of the warehouse steel situation as we see it here at the Ryerson Company. We hope you will find this summary helpful in specifying, buying and working with steel.

If you have orders with DO Priority Ratings be sure to pass ratings along to your steel supplier. This will not only expedite delivery of steel but may also help warehouses maintain inventories against your future demands. Depleted warehouse stocks of 1942 emphasize importance of working for continuous replenishment.

New loan guarantees, recently announced by the Federal Reserve are helping many small manufacturers with defense contracts. Similar to World War II V-Loan program, the new set-up provides such manufacturers with easier access to working capital.

Despite restrictions on nickel, you will still be able to obtain alloy steel of comparable performance containing other alloying elements. As warehouse stocks of nickel alloys are depleted, triple alloys, which proved their worth in World War II, will take their place. Cost — slightly less.

A word about telephone service — A tremendous number of incoming calls is taxing the capacity of our personnel and switchboards, and even of whole exchanges that serve our plants. What we are doing about it: Improved facilities are now being installed or planned for where needed. Suggested emergency measures: early calls before peak loads; telegraph; mail, which most Ryerson plants pick up hourly at P. O. for quicker service.

Improved outlook — Building for the future, the Ryerson Chicago plant is being extensively rebuilt and enlarged. In Cincinnati — a completely new Ryerson plant at new location soon to be in operation. At Philadelphia — a new mill-type slitting line gives quick service on strip steel of any width up to 48".

New machinability records for alloy steel are being set by Ryerson Rycut — a free-machining medium-carbon alloy. Shop experience shows that Rycut machines 25% to 50% faster than standard alloys of same type, annealed or heat treated.

Shortages of some products such as bars, shapes, plates and sheets are inevitable. But many others are in good supply at Ryerson. Among them:

Tubing — Good tonnage of both seamless and welded mechanical tubing is on hand and new stock is coming in regularly. So while we may be short of a few sizes one week, they may be available the next.

Inland 4-Way Safety Plate — Large and medium patterns in a good range of sizes available for those who need material combining a sure-traction surface with strength, durability and fire-safety.

Also quickly available from Ryerson: Forgings, cold drawn special shapes, tool steel, drill rod, chain, wire rope, expanded metal, Babbitt metal.

Joseph T. Ryerson & Son, Inc. Steel-service plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles and San Francisco.

News of the AUTOMOTIVE INDUSTRIES

Vol. 103, No. 10 November 15, 1950

New Car Registrations Set All-Time Record

Although new passenger cars registrations for September were down approximately 100,000 below the all-time record of 683,995 units set in August, registrations for the third quarter have established a new peak for any quarter in automotive history. According to R. L. Polk & Co., passenger car registrations for July, August and September were approximately 1,870,000 units. Truck registrations in September totaled approximately 102,000 vehicles for the fourth best month in history. For the first three months of this year 850,000 new trucks were registered, or about 150,000 more than in the same period last year. An average of 80,000 new truck registrations for the last three months of this year would enable the industry to surpass the 1948 all-time mark of 1,035,174 new trucks registered in one year.

Packard to End Year in Black After Loss

Although reporting a loss of more than $1.4 million for the first nine months of this year, Packard expects to end the year in the black. In a report to stockholders, Hugh J. Ferry, president, said that current operations are on a satisfactory basis and that possibility of a dividend payment will be considered when fourth quarter results are evaluated. He revealed that Packard holds Navy contracts totaling $5 million for Diesel engine development work and that further military contracts are being negotiated.

GE Expands Jet Facilities at Lockland, O.

The General Electric Co. is expanding its jet engine manufacturing facilities at Lockland, O. The company plans to procure additional factory space there and will move its executive and engineering staffs from Lynn, Mass., to Lockland.

Mercury Cuts Discount to Hold Prices Down

Although the Ford Motor Co. did not raise the suggested retail list prices on its 1951 Mercury models, dealer discounts were reduced .7 per cent, or about $13 on a four-door sedan, and three accessories previously listed as standard equipment are now optional. It is estimated that if all of these three accessories are purchased with the car the price would be $19.50 higher than on 1950 models. In the first instance, the price to the consumer would not be raised, but the markup to the dealer would be reduced. After the reduction in the dealer discount, however, the markup still is as high or higher than that of Mercury's principal competitors.

In its statement on prices the company pointed out that its annual labor and materials bill is up more than $78 million since the start of the Korean war. Furthermore, the tremendous costs of adopting a pension plan had been absorbed 100 per cent previously. The company also points out that ability to resist further price increases depends on maintaining volume production, availability and prices of materials, absence of strikes and other interruptions to production, possible heavier taxes and a further wage increase under its cost-of-living labor contract.

Acme

ON THE MARKET

Alfa Romeo, Milan, Italy, has placed this new type of four-door, five/six passenger 1900 car on the market. The new model is powered by a four-cyl engine developing 80 hp at 4800 rpm, and has an integral body and frame.

Curtiss-Wright Unveils New Propellers

To be known as the Turboelectric series, and designed for use with turboprop engines in the 2500-5000, 5000-7500, 7500-10,000 and 10,000 to 20,000-hp ranges, an advanced series of subsonic, trans-sonic and supersonic propellers has been revealed by the Propeller Div., Curtiss-Wright Corp., Caldwell, N. J. Initially, the newly-announced propellers will be used in aircraft capable of cruising at 50 to 600 mph. However, the research on which they are based indicates that twice these speeds can be achieved in propeller-driven aircraft of the future.

General Tire to Build New Canadian Plant

General Tire and Rubber Co., Toronto, Canada, has announced that it would start construction immediately on a $5 million plant at Sarnia, Ont. The plant will be situated on 25 acres, and the first unit of the plant itself will cover 15 acres.

Independents Protest FTC Price View

Independent automobile manufacturers have become alarmed over possible implications in a Federal Trade Commission recommendation involving major spark plug manufacturers. Kaiser-

Frazer, Packard, Hudson, Willys-Overland and Nash have filed a brief with FTC stating that the order, if carried out, would result in hardship to the independents and might result in their elimination from the field. The FTC order centers around the pricing system in the spark plug industry under which manufacturers are charged much lower prices than wholesalers and retail outlets. The independents charge that upsetting the established price system would cause the large vehicle producers to start manufacturing their own spark plugs which would further aggravate the competitive advantage they enjoy over the independent producers who cannot afford to take such action and who would be forced to pay much higher prices for spark plugs and possibly no contract for building or designing ships. Any such activity would not interfere with automobile production.

Name De Mott President of SKF Industries

Richard H. DeMott has been named president of SKF Industries, Inc., succeeding William L. Batt, who resigned to reenter government service. Mr. DeMott has been vice-president in charge of sales since 1943.

Texas Co. Completes Major Laboratory Unit

The Texas Co. has completed the newest major unit at its Beacon, N. Y., Laboratories. The building affords 55,000 sq ft of added research area, and increases by approximately 40 per cent the facilities of Texaco's main research center, the Beacon Laboratories. The design of the new structure permits maximum flexibility in the use of the laboratory space.

1950 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total Vehicles 1950	Total Vehicles 1949
First Quarter	1,342,883	294,137	551	1,637,431	1,376,068
Second Quarter	1,751,399	360,145	1,278	2,112,822	1,618,225
Total—Six Months	3,094,282	654,282	1,829	3,750,313	2,994,284
July	595,067	111,208	397	706,672	570,048
August	682,782	134,853	457	818,092	657,664
September	616,827	105,532	423	722,812	626,743
Total—Nine Months	4,988,879	1,005,985	3,108	5,997,889	4,865,096

1950 DOMESTIC TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and Less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
First Quarter	126,709	57,323	20,036	39,476	9,080	7,447	5,055	265,126
Second Quarter	158,072	65,209	21,510	48,180	11,572	10,427	7,557	322,527
Total—6 Months	284,781	122,532	41,546	87,656	20,652	17,874	12,612	587,653
July	47,590	20,991	6,550	13,488	3,780	3,489	2,684	98,573
August	58,084	24,223	7,974	16,395	4,872	5,163	2,961	121,272
September	51,888	15,082	8,476	12,844	2,651	3,317	2,090	93,348
Total—9 Months 1950	442,343	182,828	61,246	132,384	31,955	29,843	20,247	900,846
Total—9 Months 1949	357,341	214,425	59,278	115,579	21,340	15,123	11,064	794,150

* Automobile Manufacturers Association.

many other components if the order were extended to other parts.

The Electric Auto-Lite Co. said that the survival of countless thousands of "middlemen" in business is threatened by the recommended order of a Federal Trade Commission trial examiner, in a brief filed in Washington before the Commission. The examiner's order was similar to those recommended in separate cases against two other companies, Champion Spark Plug Co. and GM's AC Spark Plug Div.

K-F Stockholders Approve Shipbuilding Proposal

Kaiser-Frazer stockholders have voted authority for the company to enter the shipuilding business. They also authorized a limited expenditure for development work on new types of shipping. K-F at the moment, however, has

Chevrolet to Reach Goal of 2 Million Vehicles

Chevrolet this year expects to go over the top on its goal of two million cars and trucks set early in 1950. T. H. Keating, GM vice-president and general manager of Chevrolet, says that production of Powerglide transmissions has passed the quarter million mark and will be at the rate of 2000 a day by February. He said that with national income going up and employment at a record rate, demand for automobiles will remain high even though total registrations of cars and trucks will reach nearly 48 million by the end of this year.

Willys Gets New Order For Jeep Engines

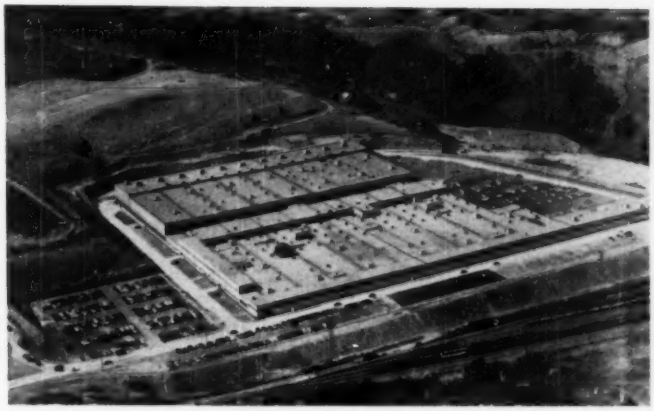
Willys has received an additional military order in the amount of more than $5.6 million for 2730 Jeep engines. The latest order from Army Ordnance brings Willys' backlog of unfilled military and civilian orders to more than $125 million. On Oct. 16 the company received an order for Jeeps totaling more than $33.4 million.

The Dept. of Commerce has announced the following contracts for the Dept. of Defense: aircraft parts—North American Aviation, $10.1 million; Lockheed Aircraft Corp., $5.1 million; GM's Allison Div., $2.6 million; Douglas Aircraft Co., $3.3 million; Goodyear Tire & Rubber Co., $2.9 million; Bendix Products Div., Bendix Aviation Corp., $1.5 million; General Electric Co., $4.9 million; trucks, GM's GMC Truck and Coach Div., $2.4 million; engines, Biederman Motor Corp., $2.8 million; trucks, $5.2 million and buses $1.8 million, International Harvester Co.; axle and differential assembly, Chrysler Corp., $5.2 million; trucks, GM's Chevrolet Motors Div., $3.3 million.

Dealers, Business Groups, CIO Protest Car Credit Curb

Dealers and other business groups have been vehement and vocal in their protests against the new credit control and have encountered a strange colleague—the UAW-CIO—in their fight. Both the dealers and the union have called upon Congress and the government agencies involved to ease the restrictions. NADA has been particularly successful in the past on the few occasions that it has appealed to Congress for action, but there has been no early indication that controls will be eased. However, a concerted effort on the part of business, particularly when it is backed by a politically powerful group such as UAW-CIO, may produce results.

One of the principal objections voiced by the dealers and some manufacturers is that the FRB's action was hasty and ill-considered since it was taken without consultation with the industry affected, and before any real evaluation could be made of the effects of the previous 21 months' limitations on automobile sales. Undoubtedly there has been an adverse effect on sales, at least in some areas of the country. In Detroit



FROM THE AIR

Providing the latest in machinery, equipment and employee conveniences, the large stamping plant recently opened at Pittsburgh by GM's Fisher Body Div. is shown here from the air.

actual sales figures compiled by the dealers' association showed that in the first 10 days after the 15 months' regulation went into effect new car sales dropped about 50 per cent and used cars nearly 60 per cent.

There is mixed but unofficial reaction among the automobile manufacturers on the new tight credit regulations which restrict time payment contracts on automobiles to 15 months. First 10-day reports available after the curtailed credit was put into effect were little help as to how seriously retail sales have been affected since about half of the 10-day period was not covered. There is little indication as to whether forward buying before the regulation went into effect may have offset reduction in the last five days of the period. Some companies still feel that there is a great enough potential market to absorb automobiles in large volume under the new regulation while others take a rather gloomy outlook. At any rate, if sales are slowed up considerably it will not result in any immediate reduction in production, but rather the inventories of dealers will go up from the very low stocks that have been prevalent during the past several months.

Boeing to Invest $3.9 Million in Seattle Plants

The Boeing Airplane Co. is going to invest $3,857,500 for research, manufacturing and operating equipment in Boeing Seattle area plants. This brings to more than $7.5 million the amount scheduled this year to be spent by Boeing for this work.

Higher Taxes and Costs Reduce GM Earnings

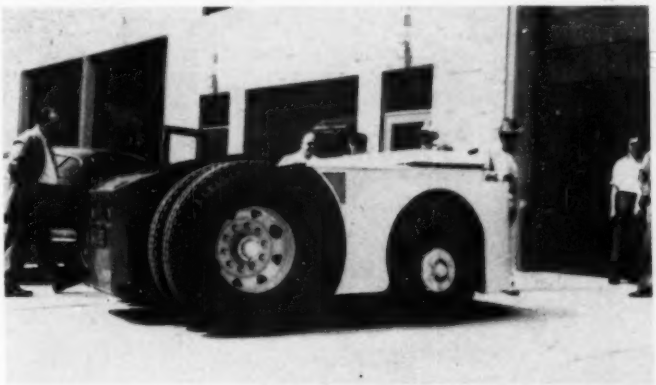
Provision for higher income taxes and increased costs of doing business are reflected in the statement of earnings of GM for the third quarter of this year. Also contributing to a decline in profits as compared with the second quarter was a drop of $14.4 million in total sales. GM earned a profit of $217,377,767 during the third quarter, compared to $272,889,624 in the previous three months. Sales of cars and trucks totaled 998,459 units, compared with 1,012,874 during the second quarter. Third quarter earnings were also reduced by increasing provision for income taxes to bring the total tax provision for the nine months to the new 42 per cent rate as compared with 38 per cent before the change in the tax law. The report also revealed that substantial additional assignments are under discussion with military authorities and that the outlook for materials is clouded with no indication of the extent to which heavier defense requirements will affect materials needed for civilian production.

Studebaker 3rd Quarter Net Under Year Ago

Third quarter earnings for the Studebaker Corp. were $4.9 million, compared with $5.5 million for the same period a year ago. However, for the first nine months of this year net profit was $19.3 million, compared with $17.2 million during the comparable period of 1949.

Lawson to Head Ford Cincinnati Plant

John B. Lawson has been named manufacturing manager of Ford's automatic transmission division at Cincinnati. He previously held the position of divison controller.



MOVES AND SPOTS

Columbia Truck & Equipment Sales, Inc's. all-purpose tractor, for moving and spotting trailers in and about terminals and warehouses, can reportedly negotiate an eight per cent grade with a 28,000-pound GVW at 6.7 mph, and a 160,000-pound GVW load at 1.2 mph up the same grade. Its top speed is 10½ mph.

News of the AUTOMOTIVE

Tucker Assets Bring $464,135 in Sales

The auctioneer's hammer struck the final blow that ended all hopes of Tucker Corp. At an auction of the company's assets in Chicago recently, all property of the defunct firm was sold for $464,135. The plant has been cleared for occupation by Ford to build aircraft engines for the Air Force.

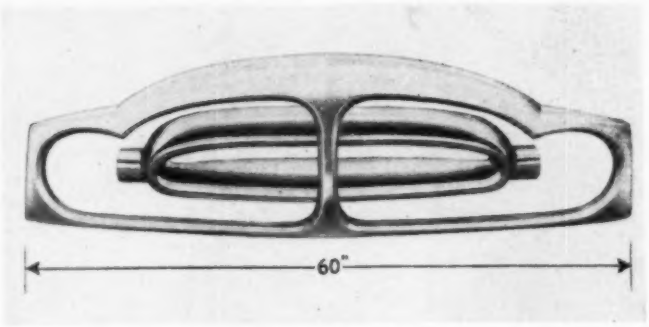
See 1950 Vehicle Output Close to 8 Million

Although there is considerable confusion and differences of opinion about the availability of steel and other materials for the balance of this year, consensus in the automobile industry is that production will remain at high levels for the rest of this year, with total output of cars and trucks approaching eight million units. There are going to be some interruptions for model changes and holiday shutdowns during these last two months, but they are expected to be of short duration. All of the optimistic predictions, of course, are qualified by uncertainty as to some unexpected arbitarary curtailment action by the government either on total production or on critical materials.

NPA has indicated that it will cut the use of aluminum, copper, and nickel by 20 to 30 per cent Dec. 1, but no details are available yet as to how that would affect 1950 production if and when it occurs. Considerable copper is used in automobile production and if satisfactory substitutes cannot be developed, a curtailment of even 20 per cent would be a serious matter. Aluminum is important for pistons and some other engine parts, but possibly other materials could be substituted for it. Nickel is used not only in chrome plating, but also for alloy steels and undoubtedly the bright work would be the first casualty of any nickel shortage. There is considerable work going on to find substitutes, however. Industry officials can find no reason for a drastic cut in steel and other materials at the present time because war contracts commitments are not yet at a point where any significant amount of materials taken from civilian production could be utilized for munitions.

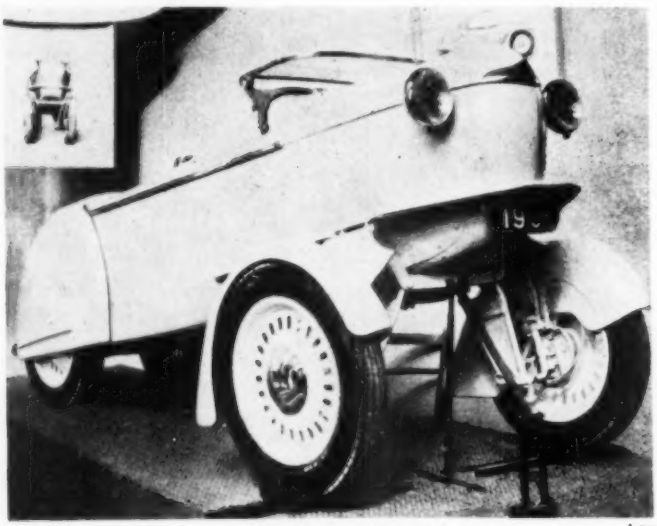
C. E. Wilson, GM president, recently said that contracts and orders committed for will not, during the next six months, absorb five per cent of the manpower in the industry, nor as much as two per cent of the average materials being used. He also said that it is a serious matter to stockpile as much as 10 per cent of current output of any commodity, and that stockpiling as much as 25 per cent causes serious price increases and business dislocations.

Another important factor is that there actually is no clear cut determination yet by the military authorities of how much basic materials are going to be required. Since it would probably take several weeks to make such a determination, it now looks as though the automobile industry will not be too seriously hampered during the rest of this year at least, and the prospects are good that production will go on about as planned. If production averages 145,000 a week for the last quarter, total output of cars and trucks will hit eight million this year. That should not be too difficult in view of current weekly rates of from 175,000 to 180,000 units.



LARGEST EVER

This new automobile grille, designed by Doehler-Jarvis Corp. engineers in collaboration with Packard Motor Car Co. is made of zinc and measures 60 in. in width. It is said to be the largest automobile grille in overall area ever die cast.



Acme

GOES ANYWHERE

This unusual Passe-Partout ("Go-Anywhere") model was shown at the automobile show held in Paris. This car features wheels which can be folded up for parking or putting in a narrow garage.

INDUSTRIES

GM Buys Detroit Plant of Chicago Pneumatic Tool

GM has bought the plant of the Chicago Pneumatic Tool Co. in Detroit. The tool company's Detroit operations will be transferred to Utica, N. Y. The purchase makes available 145,000 sq ft of building space to GM.

Rootes Distributor Plans Canadian Assembly Unit

Rootes Motors of Canada, Ltd., Canadian distributing organization for the Rootes Group in England, has acquired a 30-acre site near Toronto for construction of an automobile assembly plant. Construction will start soon on the first units to have a floor space of about 40,000 sq ft. The Rootes Group manufacture the Hillman, Humber and Sunbeam-Talbot passenger cars and two trucks—the Commerce and Karrier.

USAF Allots $200 Million for Large Presses

As a further continuation of its program for developing manufacturing techniques, the U. S. Air Force has allotted $200 million for the purchase of 25 large extrusion and forging presses. The equipment will be distributed to various cooperating companies throughout the country for developing techniques in fabricating aircraft components and large sections. At present the Air Force program for manufacturing methods research is carried on in a pilot plant at Adrian, Mich., operated by Gerity Michigan Corp. A 15,000 metric-ton hydraulic forging press removed from Germany after the war is being assembled there and will be in use within a few months. In addition, under the new press program, a 75,000-ton press will be installed at the Adrian plant.

Vehicle Taxes This Year to Hit Record High

Motor vehicle special taxes this year will hit an all-time high of more than $4 billion, according to the American Automobile Association. AAA points out special taxes on motorists passed the billion dollar mark in 1933 and exceeded $3 billion in 1947.

British Sold 11,500 Cars in U. S. in Nine Months

Analysis of sales of British cars in the United States during the first nine months of this year shows that up to the end of September about 11,500 cars were sold in this country. The British have done well in other markets, particularly in Commonwealth countries. Canada, for example, took 39,000 in the first half of this year compared with 12,000 in the same period of 1949. Several European countries have also been good customers for the British, particularly those suffering from a dollar shortage and unable to buy American automobiles.

British Automobile Exports Eight Months 1950

	1950	1949
1. Australia	86,900	42,435
2. Canada	53,840	18,951
3. Sweden	17,407	1,850
4. Union of South Africa	13,229	14,825
5. U. S. A.	9,824	2,394
6. Belgium	9,271	6,742
7. New Zealand	11,505	6,580
8. Netherlands	7,066	5,211
9. Switzerland	4,136	3,393
10. India	5,617	4,316
11. Others	50,597	48,677
Total	269,392	154,374

British Automobile Production by Years

	Output	Exported
1938	341,000	68,257
1946	219,162	86,492
1947	287,000	143,102
1948	334,815	226,911
1949	412,290	257,922
1950 (est.)	515,000	404,000

Reo Nets Over $595,000 in First Nine Months of '50

After losing more than $1.1 million during the first nine months of 1949, Reo motors, Inc., has staged a remarkable comeback to show a profit of $595,952 for the same period of this year. Sales have increased 65 per cent, amounting to nearly $30 million as compared with $17.7 million the first nine months of 1949. During the third quarter of this year the company began volume deliveries of 2½-ton military trucks.

McPeak Named to Direct Ford Motor Co. Fund

William W. McPeak has been appointed executive director of the Ford Motor Co. Fund which was founded last March. The Fund has no connection with the Ford Foundation and its purpose is "the alleviation of want and human suffering and the betterment and improvement of mankind through the making of contributions to organizations operated exclusively for charitable, scientific, literary or educational purposes." Mr. McPeak previously was assistant study director for the Ford Foundation Study Committee.

Chrysler Names Colbert President

The directors of the Chrysler Corp. have elected Lester L. Colbert president of the company to succeed K. T. Keller who was made chairman of the board. Mr. Colbert was previously president of the Dodge Div. and a vice-president and director of Chrysler Corp. He joined Chrysler as a resident attorney in 1933 and during the war was general manager of the Dodge-Chicago airplane plant. In 1945 he was made president of Dodge and was elected a vice-president and director of Chrysler Corp. in September, 1949. At 45, Mr. Colbert is one of the youngest automobile company presidents. Only Henry Ford II and Edger F. Kaiser, presidents of Ford Motor Co. and Kaiser-Frazer, respectively, are younger.

L. L. COLBERT

Mr. Keller, who will reach 65, normal retirement age at Chrysler, Nov. 27, will be the first board chairman since the death of Walter P. Chrysler in 1940. He joined the company in 1926 at the invitation of Mr. Chrysler.

He recently accepted an appointment to head the government's guided missiles program, but will still retain an active part in the overall business and management aspects of Chrysler Corp.

The Chrysler directors also reported a net profit for the first nine months of this year of $105.2 million, compared with $97.6 million for the same period in 1949. Despite the 100-day strike early this year, earnings for the nine months period were higher than any full previous year except 1949.

Higher Costs Force Tire Prices Up

Spiraling costs of natural rubber and higher labor rates have prompted another general 7½ per cent increase in prices of passenger car and truck tires and inner tubes made of natural rubber. The tire industry has also protested the government's rubber curtailment program pointing out that shipments of natural rubber to this country will undoubtedly be larger than had been expected when the original curtailment recommendation was made. The industry also says that with synthetic rubber plants rapidly coming back into production, there is a serious possibility of a rubber glut next year.

SAE Officer Nominees for 1951

The nominees for officers of the Society of Automotive Engineers, Inc., for 1951 follow: President, J. E. Hale, chief engineer, Tire Div., Firestone Tire & Rubber Co.; for members of council, E. F. Armstrong, chief engineer, General Motors of Canada, Ltd.; W. E. Beall, vice-president, engineering and sales, Boeing Airplane Co.; R. F. Lybeck, manager, aviation sales (New England Div.), Esso Standard Oil Co.; for treasurer, B. B. Bachman, vice-president in charge of engineering, Autocar Co.; vice-presidents—air transport activity, R. L. Anderson, superintendent of engineering, Chicago & Southern Airlines; aircraft activity, R. J. Woods, chief design engineer, Bell Aircraft Corp.; aircraft powerplant activity, R. M. Hazen, director of engineering, Allison Div., General Motors Corp.; body activity, F. A. Hall, truck body engineer, GMC Truck & Coach Div., General Motors Corp.; Diesel engine activity, R. W. Seniff, engineer of tests, Baltimore & Ohio Railroad Co.; engineering materials activity, F. P. Zimmerli, chief engineer, Barnes-Gibson-Raymond Div., Associated Spring Corp.; fuel and lubricants activity, C. W. Georgi, technical director, Research Laboratories, Quaker State Oil Refining Corp.; passenger car activity, G. A. Delaney, chief engineer, Pontiac Motor Div., General Motors Corp.; production activity, R. J. Emmert, executive, charge of facilities and process staff, General Motors Corp.; tractor and farm machinery activity, R. C. Williams, assistant director of research, Caterpillar Tractor Co.; transportation and maintenance activity, J. A. Harvey, superintendent of equipment and garages, Pittsburgh Motor Coach Co.; truck and bus activity, H. H. Hooker, assistant chief engineer, Eaton Mfg. Co.

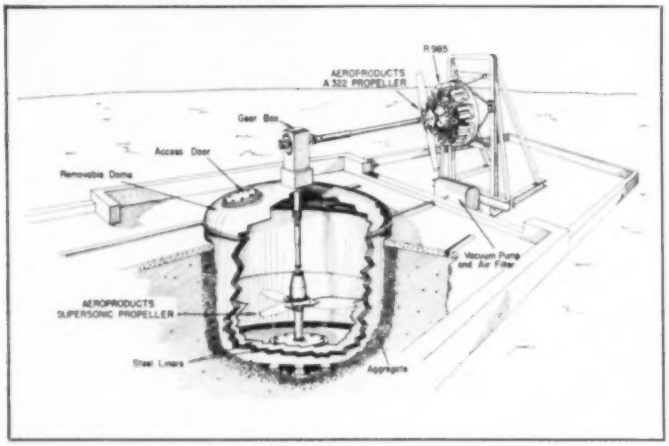
GE Opens New Laboratory in Massachusetts

Containing 142,000 sq ft of floor space, a new five-story measurements laboratory has been opened by the General Electric Co. in Lynn, Mass. The new laboratory is staffed by engineering specialists in magnetism, electricity, chemistry, metallurgy, sound, heat, light and color, and contains complete facilities for applied research product development and design in the field of measurements.

Gear Makers Met in Chicago

With more than 200 company executives and engineers in attendance, the American Gear Manufacturers Association held its three-day semi-annual meeting in October at Chicago. The meeting consisted mostly of technical committee sessions at which various phases of gear design and standards were discussed. At the session on automotive gearing a report was completed on the bending strength method for spur and helical gears and another report on the scoring factor involving calculation of the PVT value.

An outstanding paper on "Some New Materials for Consideration as Gears" was presented by C. M. Schwitter, of the International Nickel Co., who discussed the possibilities of using ductile nodular cast iron and Nitralloy steels for gears. Prof. Earle Buckingham of Massachusetts Institute of Technology received AGMA's Edward P. Connell Achievement Award. Chairman of the meeting was Leroy Brooks, Jr., AGMA president and president of Tool Steel Gear & Pinion Co.



SPIN PIT FIRST

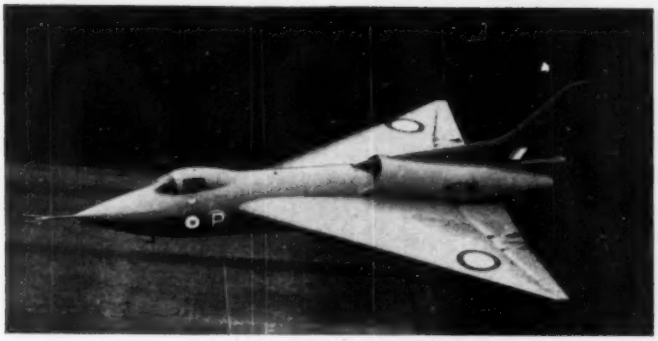
What is described as the first supersonic propeller "Spin Pit" will be in operation at GM's Aeroproducts Div., Dayton, O., early in 1951. The pit is designed to accomplish various mechanical tests upon supersonic propellers. A steel cylinder 12 ft, 10 in. in diameter, 7 ft, 10 in. high, is sunk below ground level, and secured with an air tight seal to a concrete base.

Ford Preparing Plant for Aircraft Job

Although a formal definitive contract probably will not be completed until January between the Ford Motor Co. and the Air Force for production of aircraft engines in Chicago, Ford has authorization to proceed with preliminary work. Ford has a letter of contract authorizing the company to take over the former Tucker plant at Chicago and to make any alterations required and also to acquire additional facilities if necessary. In addition, Ford is authorized to procure materials and start manufacture of engines and parts. Production is expected to get underway in about 18 months.

Italian Car Makers Seek Overseas Markets

Though the exports of Italian motor vehicles have increased since the



NOW FLYING TRIANGLES!

This first flight photograph of the Avro 707B Flying Triangle shows the large opening halfway along the top of the fuselage which is the intake for the Derwent jet engine. The cigar-shaped cylinder at the base of the fin and rudder contains a small anti-spin parachute which can also be used to slow the plane down just after landing.

war, the Italian automobile industry is searching for new overseas markets in order to replace the demand which prewar came from Italian colonies in Africa. In the course of the recently held Levant International Samples Fair at Bari, the Fiat company secured an order for 500 utility Topolino cars from Egypt; the Bianchi company of Milan secured an order for 400 trucks of 2½ tons each from Turkey and 200 trucks of 2½ from Palestine; an order for 50 buses for urban transports was secured by the O. M. from Egypt. However, these developments cannot insure the full working of the Fiat, Bianchi, Alfa Romeo and O.M. factories, and Italian automobile manufacturers have asked the Italian government to negotiate with Great Britain, Brazil and Argentina for the export of Italian motor vehicles.

Pakistan firms are negotiating with Fiat for the erection of a Fiat assembling plant in Karachi and the assistance of Fiat technical experts for the construction of a motor vehicles factory in Pakistan territory.

Chrysler President Denies Report of Stock Split

Rumors of a contemplated split in Chrysler stock have been denied by K. T. Keller, Chrysler Corp. chairman. In a press conference, he said the only discussion he had heard on the subject has been from sources from outside the company.

Fansteel Expands Tungsten & Molybdenum Facilities

To expand facilities for the production of tungsten and molybdenum, work has started on a $390,000 program for the Fansteel Metallurgical Corp., North Chicago, Ill. Much of the new equipment will be housed in the present Fansteel-Tantalum Defense plant, and to provide additional space, a second story is being built on the existing reduction building.

Rowe to Manage Ford Cleveland Plant

Ford Motor Co. has announced the appointment of Herman D. Rowe as manager of its new engine plant being built at Cleveland. Since early this year he has been coordinating activities of central staff managers in setting up new engine plants in the Rouge and at Cleveland.

Body Engineers Meet in Detroit, Nov. 1-3

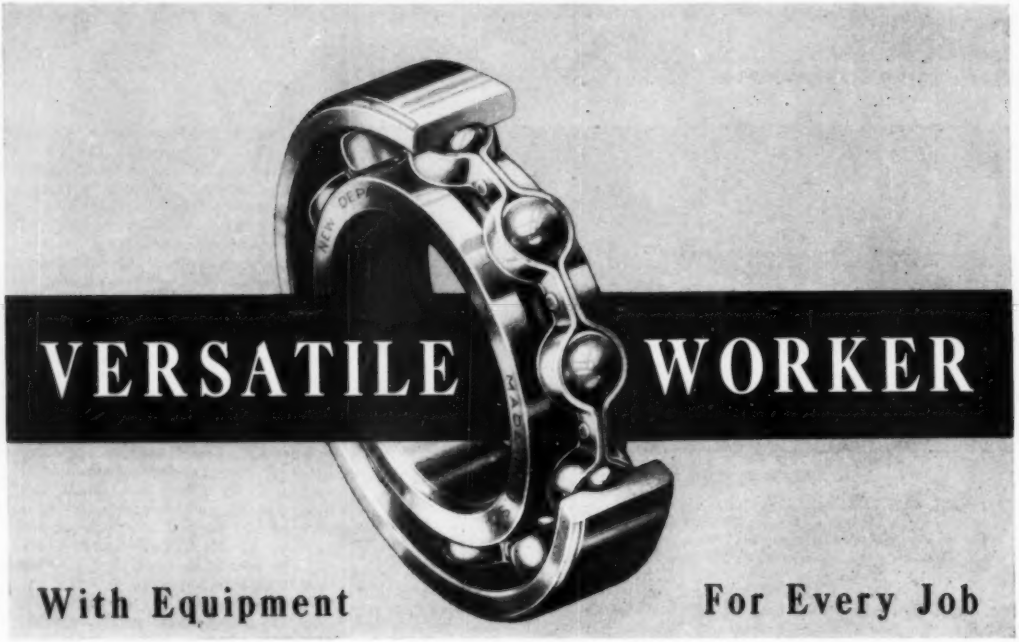
Developments in the small car field and special emphasis on materials and processes for reducing production costs were primary themes at the Annual Technical Convention of the American Society of Body Engineers in Detroit, Nov. 1-3.

During the three-day meeting, 18 papers were presented on styling, small cars, body interiors, commercial and custom bodies, development of body engineers, heating and ventilating of automobiles, production engineering, and passenger car bodies and finishes. One of the papers which attracted considerable attention was a discussion of the hot spray method of painting passenger car bodies presented by J. B. Weisel of the Hercules Powder Co. The discussion by George Romney, vice-president, Nash-Kelvinator Corp., on "Why the Small Car" was also of considerable interest in view of the current offerings of such vehicles by Nash and Kaiser-Frazer and the possibility of Willys also getting into that field soon.

Attendance at the convention this year was ahead of last year, according to Society officials. All available space in the downstairs exhibit hall in the Rackham Building was occupied by suppliers of components and materials used in automobile manufacture. Exhibitors were as follows: American-Bosch Corp.; American Metal Products; Anderson Co.; Atwood Vacuum Machine Co.; Bridgeport Fabrics, Inc.; Detroit Harvester Co.; Douglas & Lomason Co.; Engineering Reproduction, Inc.; Gehringer & Forsyth; Libbey-Owens-Ford Glass Co.; Motor Products Corp.; Owens-Corning-Fiberglas Corp.; Presstite Engineering Co.; Prestole Corp.; Randall Co.; Redmond Co., Inc.; Robin Products Co.; Shakeproof, Inc.; Soss Manufacturing Co.; Standard Products Co.; Stubnitz-Greene Spring Corp.; Swift Manufacturing Co.; Tinnerman Products, Inc.; Trico Products Corp.; United-Carr Fastener Corp.; Wood Conversion Co.; and L. A. Young Spring & Wire Corp.

ON THE LINE

The Wagner Electric Corp. conducted a plant visit recently at their main plant in St. Louis, Mo. Over 15,000 persons toured the entire plant. Here visitors view complete brake assemblies on the production line.



VERSATILE WORKER

With Equipment For Every Job

With shield on one side for protection against abrasive dirt.

With shields on both sides to keep dirt out and lubricant in.

With snap ring for location of bearing in housing.

With snap ring and either one or two shields as required.

With contact seals, lubricated for long life without attention.

A standard New Departure single row ball bearing may be had with about a dozen different combinations of seals, shields, snap rings, etc., to simplify mounting, lubrication or enclosure—in short it may be had with the equipment to do each specific job best.

But basically you always have one of the most useful and dependable workers ever devised—taking radial loads and thrust loads from either direction—locating parts accurately and permanently -all in one unit requiring no time-wasting adjustment or other attention.

Nothing Rolls Like a Ball

NEW DEPARTURE BALL BEARINGS

NEW DEPARTURE · DIVISION OF GENERAL MOTORS · BRISTOL, CONNECTICUT

1M

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

1st Annual "Motorama," Los Angeles .....Nov. 16-19

Power & Mech. Engineering Exposition, New York City ...Nov. 27-Dec. 2

Nat'l Standard Parts Assoc. Convention, Chicago .....Dec. 1-2

Auto. Service Industries Show, Chicago .....Dec. 4-8

SAE Annual Mfg. & Engineering Display, Detroit .....Jan. 8-12

Nat'l Assoc. Engine & Boat Mfrs. Nat'l Motor Boat Show, New York City .....Jan. 12-20

Plant Maint. Show & Conf., Cleveland .....Jan. 15-18

Soc. of Plastic Engrs., New York City .....Jan. 18-20

4th Annual Hot Rod and Motor Sports Show, Los Angeles ..Jan. 25-28

Inst. of the Aeronautical Sciences, New York City .....Jan. 29-31

Nat'l Auto. Accessory Mfrs. Assoc., New York .....Feb. 5-8

SAE Passenger Car Body & Materials Mtg., Detroit .....Mar. 6-8

International Auto Salon, Geneva, Switzerland .....Mar. 8-18

Amer. Soc. Tool Engrs., New York City .....Mar. 17

Pacific Automotive Show, Seattle Mar. 21-24

Salone Internazionale Dell Automobile, Turin, Italy .....Apr. 4-15

Amer. Soc. Lubricating Engrs., Phila. .....Apr. 16-18

Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic City .....Apr. 17-20

Chamber of Commerce Annual Mtg. Washington, D. C .....Apr. 30-May 2

Materials Handling Conference, Chicago .....Apr. 30-May 4

A.E.R.A. Convention, Chicago ....May 7-9

Nat'l Air Races, Cleveland Airport May 19-20

Amer. Society for Quality Control, Cleveland .....May 23-24

Third World Petroleum Congress, The Hague, Scheveningen, Holland .....May 28-June 6

American Gear Manufacturers Assn. (Annual Meeting), Hot Springs, Va. .....June 4-6

Stewart-Warner Corp.—**John F. Fennelly**, partner, Glore, Forgan and Co., has been elected to the board of directors of Stewart-Warner Corp. filling the vacancy caused by the death of **Charles F. Glore** on October 6.

Consolidated Vultee Aircraft Corp.—**Gage Irving** has been appointed assistant to the president and **K. F. Leaman** is new manager of the company's San Diego, Calif., division.

Carboloy Co., Inc.—**I. L. Wallace**, formerly Superintendent of the carbide metal division, has been named Manager of Engineering on both carbide and other special metals. **J. A. Muldoon**, formerly Superintendent of the carbide fabricating division has been advanced to Manager of Manufacturing for carbides and other special metals. **R. L. Brownlee**, formerly Production Manager on carbides will also act in the same capacity for other special metals. **F. C. Ritner**, in addition to his responsibilities as Vice-President in Charge of Research, will assist **Mr. E. F. Wambold**, Executive Vice-President, in a general administrative capacity.

The Bullard Co.—**Frank U. Hayes**, Sales Manager, has been elected a director of the company to succeed **E. P. Blanchard**, formerly Director of Sales, who retired as of September 29, 1950, after 30 years with the company.

American Brake Shoe Co.—**William T. Kelly, Jr.**, has been appointed president of American Brakeblok Division of the American Brake Shoe Co., and will continue as president of the Kellogg Division, manufacturers of air compressors and paint spray equipment. Vice President **Maynard B. Terry** will continue in charge of Brakeblok sales.

Allegheny Ludlum Steel Corp.—**Ralph S. Euler**, senior Vice President of Mellon National Bank and Trust Co., has been elected to the board of directors. His election fills a vacancy created by the death on September 5 of **William F. Detwiler**, director and honorary chairman of the board of directors.

E. W. Bliss Co.—**Lucien R. Collart** has been elected secretary and treasurer. He succeeds **E. S. McClary**, who died September 23, 1950.

Caterpillar Tractor Co. — Announcement is made of creation of an additional executive vice presidency and promotion of four administrative and departmental heads. **Harmon S. Eberhard** is new Executive Vice President. Vice President **William Blackie** will now coordinate with Peoria the administration of the Joliet and San Leandro plants and Caterpillar Tractor Co., Ltd., new British subsidiary. **E. W. Jackson** and **Ralph M. Monk** have been named Vice Presidents. **W. H. Franklin**, controller, will assume new administrative direction of the Accounting and the Traffic & Order Departments. **A. N. Whitlock** will assume direct supervision of Accounting.

Bede Products, Inc. — The appointment of **Frank G. Drake** as General Sales Manager is announced. Mr. Drake will succeed **Richard E. Estabrook**, who is advanced to General Manager.

The DeVilbiss Co.—**Emil F. Frey** has moved upward from his former post of Assistant Sales Manager to become Director of Sales Promotion and Advertising. Former Assistant Sales Manager **Henry M. Kidd** has become Sales Manager of spray equipment sales. **John M. Ehni** now assumes the joint duties of Export Manager and branch plant Coordinator.

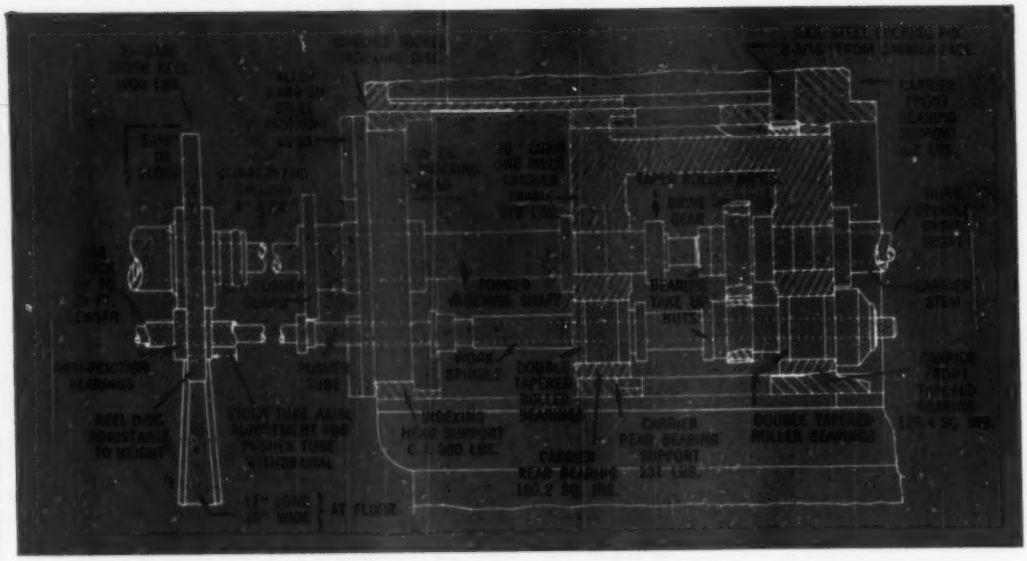
Export Div., Chrysler Corp.—The appointment of **J. A. C. Wilke** as Sales Representative for India, with headquarters in Bombay, has been announced. Mr. Wilke will cooperate with The Premier Automobiles, Ltd., in both distribution and sales activities.

Dodge Div., Chrysler Corp.—Appointment of **Edward V. Howe** as regional manager of the Syracuse region for the Dodge Division of Chrysler Corp. is announced, his territory to include parts of N. Y. and Pa. At Syracuse he succeeds **Edward R. Taylor** who has been named regional manager of the New York region. Appointment of **John E. Noll** as regional manager of the Oklahoma City region is also announced, his territory to include parts of New Mexico, Oklahoma and Texas. Likewise is announced appointment of **James R. Davis** as regional manager of the Greensboro, N. C., region, his territory to include parts of N. C., S. C., Va., Tenn. and W. Va. At Greensboro Mr. Davis succeeds **Edward P. Letscher** who is to open a new regional office.

(*Turn to page* 114, *please*)

Necrology

William C. Winfield, 46, designer and builder of racing automobiles, including the Novi Special models and parts, died on Oct. 29 in Fresno, Calif.



FIRST THINGS COME FIRST

Upon the Spindle Carrier of an "Automatic" falls the responsibility of accurately presenting and holding the work to — and in contact with — the tools. The basic design of the Carrier is obviously of first importance in the protection of the work spindles from the strain of heavy cuts and weight of the bar stock. Then, in proportion to the Carrier's ability to handle the full load is the importance of any supplementary facility that shares the load.

1. **The 1½" Six Spindle CONOMATIC CARRIER gives better support to the work spindles under heavy loads.**

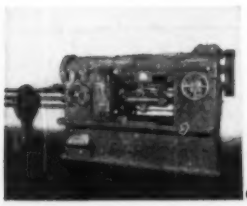
The thick, heavy ribs resist strain. The tapered front bearing and the spindle drive gears are within 3" and 9¼", respectively, of the collet faces. The wider spaced bearings give better alignment and load distribution. The Carrier is free of Cross Slide positive stop pressure.

2. **The entire INDEXING MECHANISM is supported by the Top Bed as well as the Base. There are fewer wearing parts.**

The Indexing Head takes the brunt of the indexing load. It is supported by the short frame member midway between the Carrier and the Stock Reel. It is joined to the latter by strong center shafts.

3. **The STOCK REEL is designed to handle longer and heavier loads.**

The two Stock Reel Bases are independent of the machine and relieve it of the heaviest part of the bar load during the cutting and indexing movements. Adjustable alignment gives freer stock-feed action.



Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

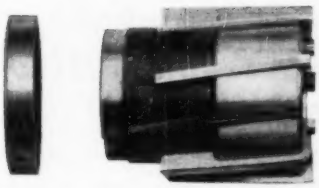
Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

Select BARBER-COLMAN REAMERS FOR COST CONTROL and SIZE-FINISH CONTROL

ON-THE-JOB Features

- LOW-COST BLADE REPLACEMENT
- EASY SIZE ADJUSTMENT
- CONTROLLED SIZE, STRAIGHTNESS, ROUNDNESS AND FINISH



All Extra Parts Eliminated. Pins and Wedges Hold Blades Solidly Against Body, Comparable to Solid Flute Design.

If you choose between accurate, quality reamed holes — and low-cost reamer maintenance and operation — you can have both by using Barber-Colman Adjustable Reamers.

Barber-Colman pin and wedge design provides more blades per reamer diameter for better cutting action. Blades are solidly held in perfect diameter, avoiding any possibility for variation in roundness or straightness. Size adjustments are easily and quickly made, with size readily checked across any two blades.

These features mean better and faster results, with less cost per hole machined. Ask Barber-Colman reamer engineers to assist on your reaming jobs, or send tool and part prints for recommendations.

Free **PRODUCTION DATA**

Current Case Histories of Reaming Jobs Taken Directly From the Field. Get a Set Today. Ask For File 9645.

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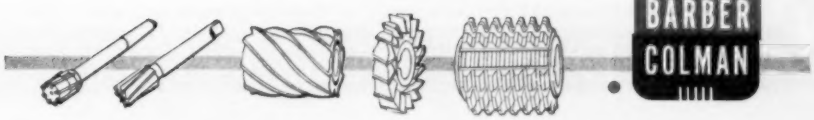


BARBER COLMAN

The Microcarb Control for the new Series H Homocarb Furnace occupies panel at left in above photo, next to the usual temperature control panel. (1) is the Carbohm primary element; (2) the Microcarb controller for carburizing atmosphere; (3) the Micromax Atmosphere Recorder.

Now!

Carbon content of steel surfaces AUTOMATICALLY CONTROLLED in Homocarb Furnaces

Users of the Series H Homocarb furnace equipment can regulate steel surface carbon content as easily, automatically, as temperature is controlled. Now, for the first time, carbon content of furnace atmosphere can be continuously regulated for the desired type of controlled surface carburizing, homogeneous carburizing, carbon restoration and annealing.

This new feature is called Microcarb Control. It consists of three units: (1) a carbon detecting primary element...called a Carbohm...located right in the furnace work chamber; (2) Microcarb Controller which regulates throughout a range of 0.15 to 1.15% of carbon; (3) Model S Micromax Recorder, which gives a continuous and permanent record of per cent of carbon in furnace atmosphere.

Microcarb Control automatically regulates the flow of Homocarb fluid so as to control the carbon potential of the furnace atmosphere. This means the surface chemistry of the steel being treated can be either maintained or changed to give any desired carbon content. Microcarb Control added to the Series H Homocarb furnace, with its many important features . . . its solid bottom retort, new fan housing and work support, aerodynamically designed vanes and discharge jets . . . makes the furnace equipment a superior tool for improving quality and cutting costs of heat treatment.

For further information, write us at our nearest office or at 4966 Stenton Avenue, Philadelphia 44, Pennsylvania.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

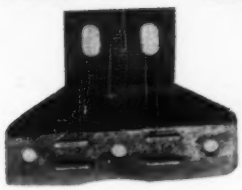
LEEDS & NORTHRUP CO.

Ld. Ad T-620(30)

Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.
Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.
Continuous Type Broaching Machine. Made in 4 Sizes.

MACHINE FASTER

teeth, serrations and slots



● Slots, serrations, teeth, flat and curved sections are all being surface broached on many jobs faster, more accurately and at less cost than they had formerly been machined. Surface broaching is applicable to steel, cast iron, bronze, copper or aluminum parts. Machines may be tooled up for one specific operation but in many cases more than one part can be surface broached on one machine by using additional sets of tooling. May we work with you in finding where Footburt Surface Broaching Machines can save you money in your plant?

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

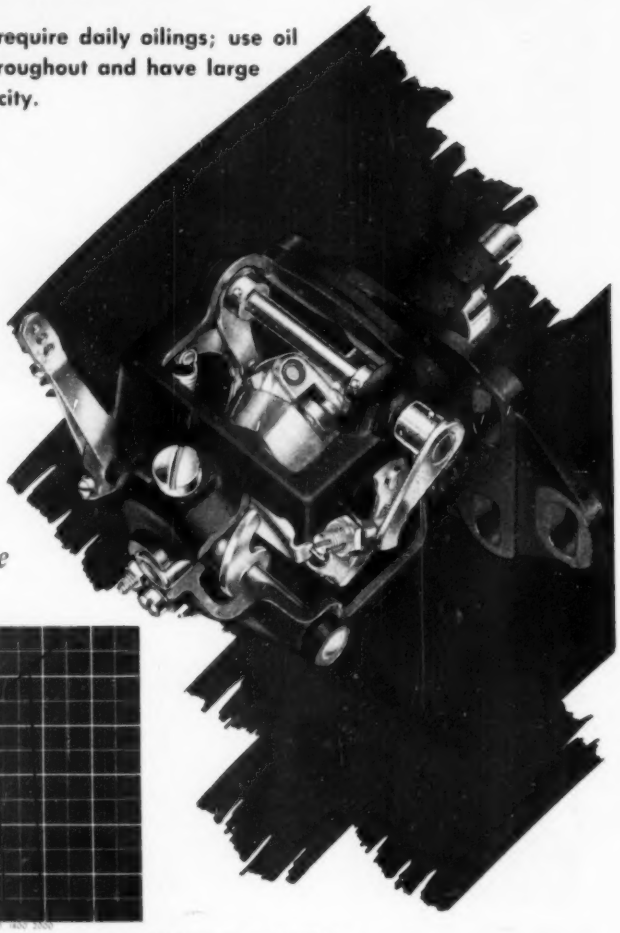
Detroit Office: General Motors Building

FOOTBURT . . . *a time tested line of machine tools*

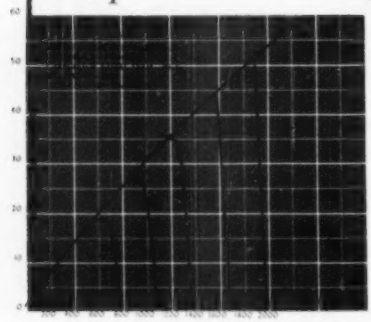
INVESTIGATE *Surface Broaching* FOR DIFFICULT MACHINE WORK

HOOF MECHANICAL GOVERNORS.....

1. Provide close regulation over wide operating range, *without spring change.*
2. Employ ball or roller bearings at all load points.
3. Do not require daily oilings; use oil seals throughout and have large oil capacity.



This is the Performance Graph



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HOOF PRODUCTS COMPANY

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THE ECONOMICAL OIL SEAL FOR LIMITED SPACE APPLICATIONS

VICTOR VICTOPRENE TYPE K3

for Shafts up to 2-inch Diameter

TAKES LESS SPACE AXIALLY AND RADIALLY

This modern Victoprene oil seal fits the most compact shaft assemblies. Minimum over-all dimensions of K3 seals in all sizes eliminate the usual problem of adequate housing space.

ONE-PIECE MOLDED CONSTRUCTION

Extreme compactness means no sacrifice of sealing efficiency. Sustained high performance is assured with a specially developed construction. The Victoprene sealing element and metal channel are molded into one integral unit, with a continuous coating of Victoprene on face and outer periphery.

SUITED FOR WIDE APPLICATION

Victoprene has the highest rating for resistance to lubricants, heat, and aging. It meets the needs of most sealing services as proved in countless applications. Structurally, K3 seals have withstood the severest tests in laboratory and field.

GET THIS DESCRIPTIVE CIRCULAR

Sizes, dimensions, service recommendations and installation data on K3 seals are given in Circular S-790, sent on request. Write direct, or ask your Victor Field Engineer for a copy. No obligation.

Victor Manufacturing & Gasket Co., *and its affiliate* Victor Sealing Products Co. Inc., P. O. Box 1333, Chicago 90, Illinois.

7 Features of the K3 Thin Seal

supplied with or without garter spring

1 **.250" OVERALL WIDTH IN ALL SIZES,** maintained to plus or minus .015". Available currently for shaft diameters from .312" to 2.000".

2 **IMPROVED VICTOPRENE SEALING ELEMENT** retains full efficiency at all shaft surface speeds up to 3000 F.P.M. and at temperatures from minus 40 deg. F. to 275 deg. F.

3 **NEW ONE-PIECE MOLDED CONSTRUCTION**—Sealing element is simultaneously molded and permanently bonded with metal channel to form one integral unit. Continuous coating of Victoprene on face and outer periphery of body provides effective sealing at these points.

4 **GREATER FLEXIBILITY — LESS FRICTIONAL DRAG**—Hammerhead design (limited contact of sealing face) with its adjoining thin wall section provides maximum flexibility in sealing element action, with minimum drag on shaft.

5 **NON-SHIFTING SPRING TENSION**—Type K3 seals equipped with garter spring have a molded "V" groove in sealing element which holds spring in proper location to maintain uniform pressure around the shaft.

6 **EASY TO INSTALL**—A rigid frame for installing the seal is provided by the integral metal channel. The tapered lead-in on the toe side of outer periphery locates the seal and permits easy entrance into the bore. General procedure for pressing into bore is the same as for metal encased seals.

7 **PERMANENT IDENTIFICATION** appears on the face of each TYPE K3 seal, giving the catalog number, shaft size, and the name "Victor."

VICTOR GASKETS AND OIL SEALS — SEALING PRODUCTS THROUGH RESEARCH

VICTOR

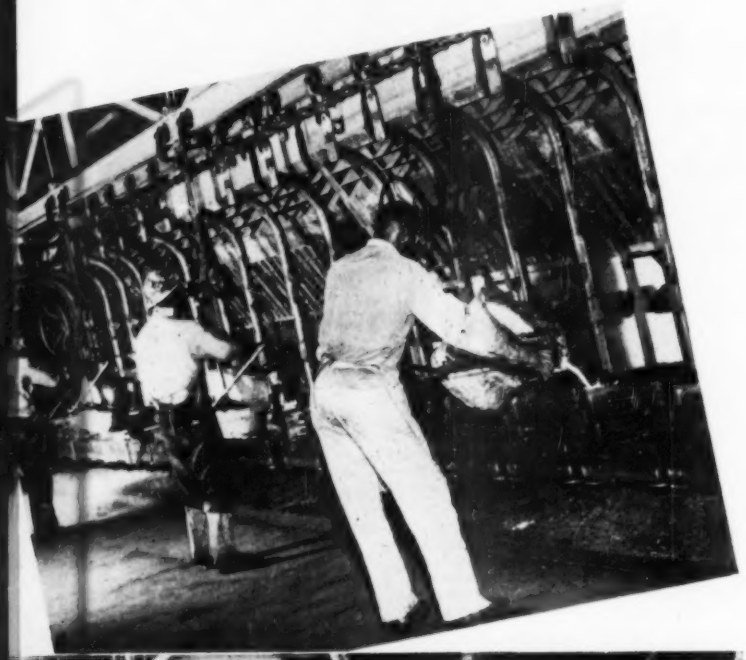
A MODERN $1.5 million foundry for the production of automobile brake drums has been placed in operation by The Budd Co., manufacturers of railcars and long-time producers of passenger car and truck bodies, wheels, frames, and brake drums. Located on 22 acres in northeast Philadelphia, adjacent to the Red Lion Plant, where all-stainless steel railway passenger cars are manufactured, the new foundry is presently turning out a total of 500 automobile brake drums per hour with the use of one production line. In addition to increasing total productive capacity, the location of the new plant in the Philadelphia area will enable Budd to better serve the eastern plants of its automotive customers. The entire manufacturing area is 51,132 sq ft and sufficient floor space has been allotted for the erection of another molding line when production requirements warrant its construction.

Raw materials necessary for brake drum manufacture are brought in at the rear of the building by either rail or truck. Material is then removed from the stockpile and placed in a charging bin by an overhead yard crane. A charging crane—located on the third floor and situated above the cupola entrance — lifts a cone-bottom charging bucket from the foundry floor and places the charge in the cupola. The bucket rests on a wishbone inside of the cupola when dumping the charge.

Of all the charging equipment, one piece in particular—the charging crane—is rather unique. It was designed especially for the Budd foundry. This crane operates on a 28 ft diam runway can be positioned in the direction of the cupola to be used, therefore, only one motion is required to advance the charge into the cupola. Positioning of the crane is done once each day by means of a hand chain.

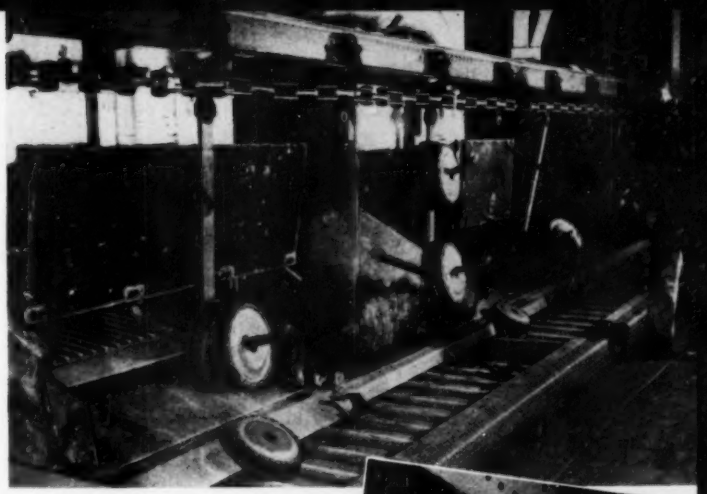
Two cupolas, each 75 ft high and 7½ ft ID, have been installed in the plant, but only one cupola is used each day. Since only five tons of metal per hour are needed, the cupolas have been bricked down to four ft ID. Both cupolas are equipped to take hot blast when production requirements deem the expenditure economical.

Whiting Corp. supplied the cupolas and the necessary charging equipment which consists of the yard crane, charging crane, iron



(Top) Molten metal is being poured just before the molds reach the smoke hood; the operators are working in a direction against the movement of the molding conveyor. Pendulum type hangers are used on the 472 ft long molding conveyor. A 145 ft long pouring conveyor is used for the ladles.

(Left) Castings are removed from the cooling conveyor and placed in this Pangborn nine-ft diam multi-spindle Rotoblast table machine for primary cleaning.



Hot castings are shown being removed from the sprue conveyor and placed on the cooling conveyor. Sprue is conveyed to the foundry return stockpile while the hot brakedrum castings traverse the 850 ft long cooling conveyor.

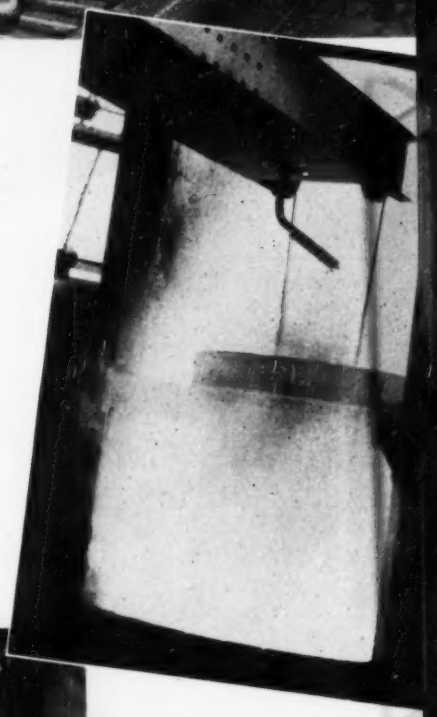
By Thomas MacNew

New Budd Foundry Produces 500 Brake Drums Per Hour

charging platform, coke and stone hopper, transfer car, blower system and ash arrestor system, along with miscellaneous equipment.

Designed so that the number of floor pits and sand elevators is held to a minimum, the foundry has sand handling equipment with a capacity of 75 tons per hour. A spill sand conveyor in the floor

(*Turn to page* 110, *please*)



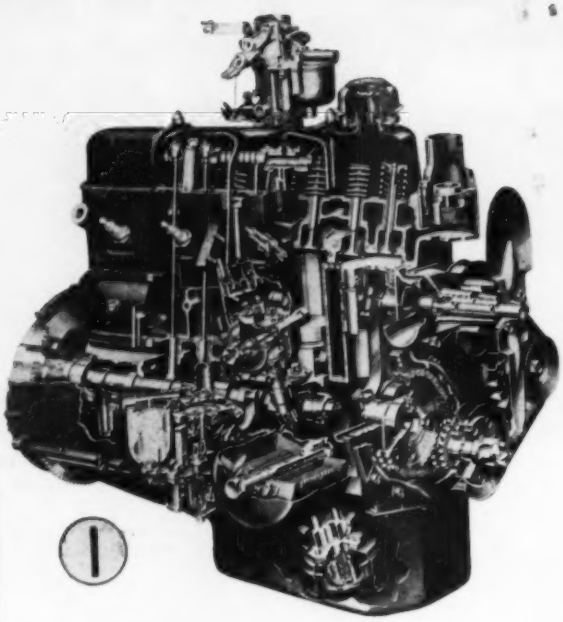
(Above) The charging crane, which operates on a 28 ft diam runway, is shown lowering a cone bottom charging bucket into one of the cupolas. A wishbone in the cupola holds the bucket in position while the charge is dropped.

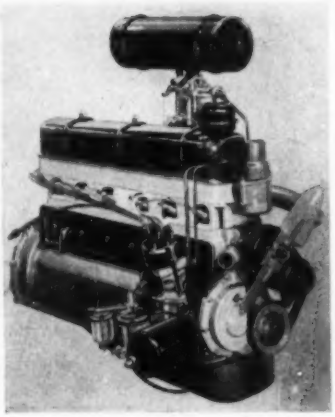
(Left) This view shows a flask being pushed off of the conveyor and into one of the Simplicity shakeout machines. Note how the fork of the air-operated ram engages both sides of the conveyor hanger pipe support and touches the flask in two places.

Ford Introduces

London

By W. F. Bradley
Special European Correspondent
for Automotive Industries



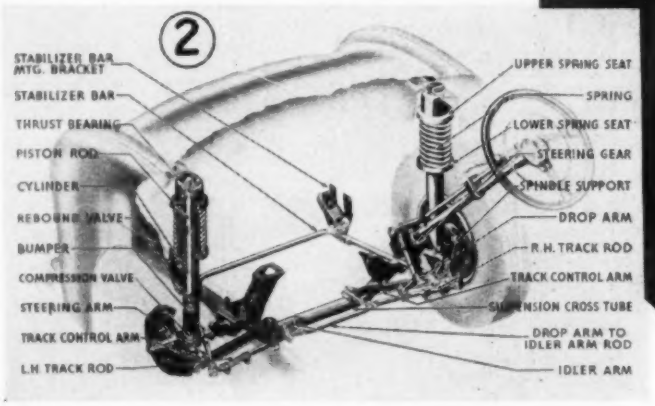


London, England

An outstanding technical feature at the 35th London automobile show in October was the appearance of two new models from the Ford factory, thus bringing the Dagenham company in line with other British car manufacturers who introduced their postwar models either a year or two years ago. The new Fords, named the Consul and the Zephyr, have four and six cylinder engines of 92 and 138 cu in. piston displacements, respectively. The new cars feature a valve-in-head "square" engine, hydraulically-operated clutch, independently sprung front wheels, an all-steel Briggs welded integral body, hydraulic brakes and new styling. Listed at $1153 for the four and $1330 for the six, they enter the lower price category, being just a little higher than the Vauxhalls, made by the only other American-controlled firm in Britain.

Apparently there is no immediate intention of dropping the Ford L-head models, the Anglia and the Prefect, and if this is done the change will be gradual. The V-eight Pilot will be with-

1—Cutaway and exterior views of Ford Zephyr Six. Consul Four engine is of similar design.



2—Design details of independent front suspension on new British Fords.

Overhead Valve Models at
Automobile Show

drawn at an early date, according to reports.

The two new models are identical in design, with a considerable amount of interchangeability of parts, the cylinder bore in each case being 3.125 in., with a stroke of 3 in., thus following the strong European tendency towards short stroke engines. With a compression ratio of 6.8 to 1, the output is 47 hp at 4400 rpm for the four and 68 hp at 4000 rpm for the six. Valves are inclined in the iron head and are pushrod operated, the camshaft being chain driven. Lubrication is a submerged gear pump to main, connecting rod and camshaft bearings, equipped with an oil filter. A Zenith downdraft carbureter is used. Ignition is 12 volts, with automatic advance and additional vacuum control. The gasoline pump is in unit with a vacuum pump to operate the windshield wipers.

Independent front suspension is distinctive. A tubular king pin forms the cylinder of a direct acting shock absorber. At the head of the pin there is a cup bearing on a coil spring which carries the weight of the car, the whole assembly swivelling in a large roller bearing mounted in rubber below the housing of the fender top. At the lower end of the king pin, but offset from it, there is a ball joint with connection by a link to the frame cross member. This link forms one arm of a wishbone, the other arm being a part of the anti-roll bar clamped to another frame cross member. This resolves itself into a wishbone attachment, with one arm locating the king pin transversely and the other, or anti-roll arm, locating it in a fore and aft direction.

The drive system consists of a single plate clutch, the operation of which is hydraulic through a piston in a master

3—Consul Four to be built by Ford.

4—Ford's new Zephyr model powered by 68 hp six cylinder valve-in-head engine.

cylinder fed from the brake line, three-speed transmission with synchromesh in second and high, Hotchkiss drive and hypoid rear axle. The one-piece Briggs body has stiffening rails front and rear to which the mechanism is attached.

Styling is a complete breakaway from previous Ford practice, the bodies being pontoon type with four doors and a one-piece curved windshield, having accommodation for five to six passengers. Wheelbase of the "four" is 100 in., with a front tread of 50 in., while the "six" has a wheelbase of 104 in. and the same tread as the four cylinder model. Tires are 5.98-13 for the smaller car and 6.40-13 for the larger model. Curb weight is respectively 2435 and 2591 lb.

Austin introduced a sports version of the four cylinder A-40 model. Larger valves and double springs are provided, but compression ratio and camshaft remain unchanged. There are two carbureters and output is stated to be 46 hp at 4400 rpm. The curb weight of the car is 2016 lb. Other Austin changes are the introduction of the Hereford sedan and the coupe replacing the Hampshire sedan. The Hereford embodies new styling of the Italian type, with full width front, the hood sloping down into a small radiator grille, with wide horizontal louvres below it to pass air for brake cooling. The all-steel body gives additional width, it has a fixed one-piece curved windshield and concealed door hinges.

All the Nuffield cars being new last year, few changes have been made. The Morris Minor now has a four-door sedan body, with modified headlamps to conform to American and Canadian practice, but this model is only for export. On the Morris six-cylinder model and on the two Wolseley cars, twin telescopic shock absorbers are used, these bearing on the top support arm at each side of the front end.

Sunbeam has come into line with independent front suspension of the coil spring wishbone type, and a larger four cylinder valve-in-head engine of 138 cu in., which develops 70 hp at 4000 rpm. Armstrong-Siddeley has introduced a limousine on the standard chassis. Jaguar attracted a lot of attention with the Mark VII, a handsome full width sedan with the 120 sports engine rated at 160 hp at 5200 rpm. This car is for export only at $2794. One of the layout features is the employment of two gasoline tanks in saddles around the wheel housings, one tank containing seven and the other 10 Imp. gallons. This gives much increased space for baggage carrying in the trunk. The windshield is the open V-type and a sliding roof is fitted.

Healey has linked up with Nash to produce the Nash-Healey roadster, with the original Riley engine

(Turn to page 112, please)

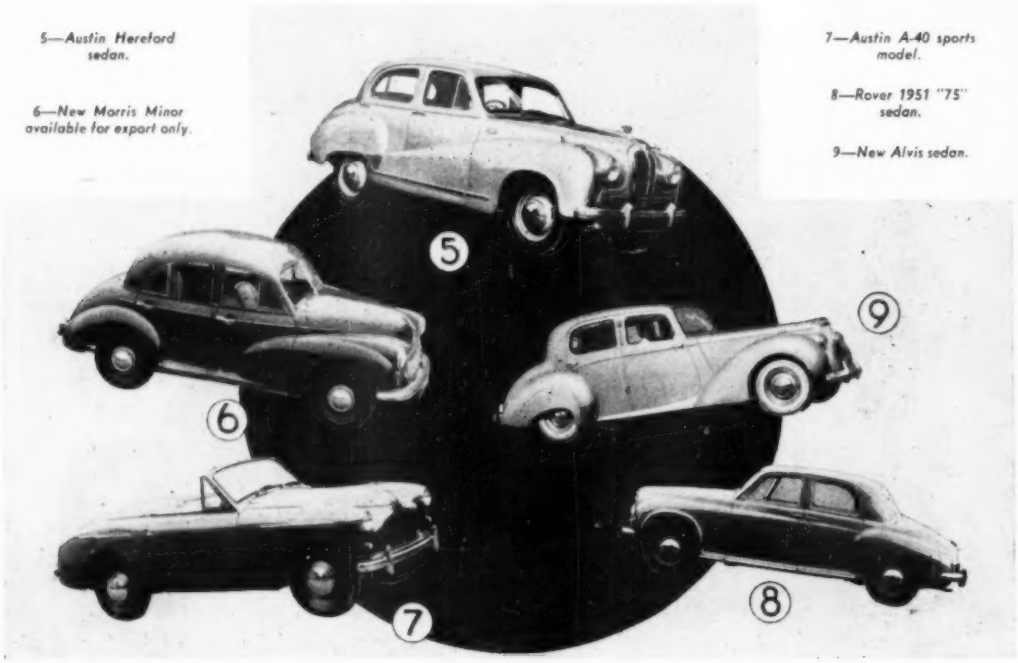
5—Austin Hereford sedan.

6—New Morris Minor available for export only.

7—Austin A-40 sports model.

8—Rover 1951 "75" sedan.

9—New Alvis sedan.



Lincoln Cosmopolitan sport sedan.

Styling Changes in Lincolns for 1951

BIGGEST news regarding Lincoln models for 1951 is in the major change in eye appeal and external styling, effected by the introduction of new rear fenders and quarter panels, more massive bumpers front and rear, and tasteful treatment of the grille. Interior treatment, hardware, and lamps all are fresh and distinctive. Headlamps have been mounted farther apart and have a narrower bezel.

Rear fenders extended considerably beyond the profile of the trunk lid terminate in wing tips giving not only a changed appearance but a feeling of greater overall length. With the introduction of new quarter panels the rear body cross sill has been reinforced to provide for greater structural rigidity.

Cosmopolitan models, on the other hand, feature primarily new grille treatment, new bumpers front and rear, and fresh ornamentation and lamp treatment. Interior trim and hardware also have been restyled. As to ornamentation, the former heavy molding on the front fender has been replaced by a streamlined molding running the full length of the car. Fender skirts are standard on the Cosmopolitan, optional on the Lincoln.

Mechanically both Lincoln and Cosmopolitan remain unchanged save for certain improvements in the engine. The cylinder block now is being made with more alloy in the composition to increase cylinder bore durability. For the first time, too, Lincoln will balance the entire engine assembly in production. Selective fittings of all main bearings as well as hydraulic valve lifters also have become standard practice in production.

Late in 1950 production Lincoln engines were fitted with three-ring pistons and this is continued in 1951. Some additional improvement in oil economy has been effected through the introduction of various drain holes.

Largely as a result of refinement and reduction of frictional losses the 1951 engine is rated at 154 bhp as compared with 152 previously. Better distribution of cooling water to exhaust valves is effected by the addition of distribution tubes in the water passages. Fuel pumps now incorporate a double-acting booster pump of increased capacity to improve windshield wiper operation.

The ventilation system has been refined and improved by using individual control for each of the ducts.

Hydra-Matic drive is being continued on Lincoln and Cosmopolitan models at extra cost.

Large Scale

Walter E. Jominy, Chrysler engineer, new president of the American Society for Metals.

Walter E. Jominy, staff engineer, Chrysler Corp., was installed as president at the annual meeting of ASM, and John Chipman, head of the department of metallurgy, Massachusetts Institute of Technology, as vice president. William H. Eisenman was re-elected as secretary for a two-year term.

One of the important events during the week was the ASM Business Forum. Charles E. Wilson, president, General Motors Corp., spokesman for the automobile industry, predicted that defense requirements will not absorb five per cent of the automotive industry's manpower during the next six months nor two percent of its materials. He stated that the production of cars and trucks would not be a great deal higher if there were unlimited quantities of steel, tires, non-ferrous metals and other miscellaneous items as most of the units of the industry are operating at or near their capacity, although with considerable difficulty. Mr. Wilson said that there are four important phases to the problem of simultaneous production for war and peace:

First: Appraise the basic raw material requirements for war production.

Second: Determine what materials should be stockpiled and how much of each, particularly those produced outside the United States. A review of our stockpiling policies with the producers of these commodities, where they are American Concerns, and with the users of these commodities, both for peace and war, would be well worth while.

For genuine interest and for the amount of equipment sold right off the floor, the 32nd National Metal Congress and Exposition held last month probably surpassed any previous event of its kind. Many of the machines shown were shipped from the Metal Show directly to purchasers instead of back to the exhibitor's plants. The displays of cost-cutting equipment, processes, and materials, which filled practically all of the available space at Chicago's International Amphitheatre, while not new in most instances, were of still greater interest to the many thousands of visitorse bcause of conditions since Korea.

As usual, the American Welding Society, Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing co-sponsors of the Exposition, held technical sessions concurrently with those of the American Society for Metals. In addition to these technical sessions, the Production Theatre, which was filled beyond its seating capacity, illustrated high-production methods by means of motion picture film. Methods shown were welding, lapping, sawing, brazing, Marforming, and die casting.

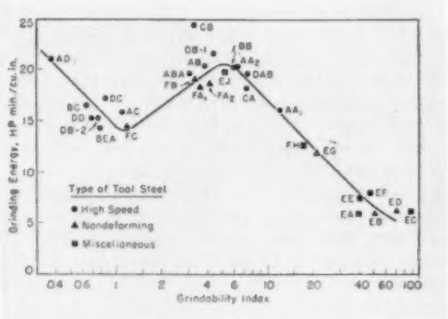


Fig. 1—Grindability data for a variety of tool and die steels heat treated in normal fashion and ground with a 32A46-18VBE wheel. Grindability index is volume ratio of material removed to wheel wear. *(See page 126).*

Buying at Metal Show

Third: Because of the greater number of man hours required per lb of material used in the production of military items than on civilian goods, the real shortage will be manpower. This shortage will be further aggravated by the number of men required for military service. This means that temporarily we should increase the work week to as much as 45 hours. This could be reduced to 40 hours when the emergency is over.

Fourth: Pay for our military and foreign aid programs as we go and adopt all possible measures to fight inflation.

According to Wm. V. O'Brien, commercial vice president of General Electric Co., energy sales will increase to 367 billion kilowatt hours annually by 1955, a 32 per cent gain over 1950. Mr. O'Brien said that he expects sales of electrical producer goods, with the exception of transportation and military equipment, to be eight per cent higher next year than during 1950.

By H. H. Roberts

Edward L. Ryerson, chairman of Inland Steel Co., pointed out the danger of socialization of American industry with steel as the first target. On the subject of expansion of the steel industry, he said that the estimated expansion of 10 million ingot tons during the next two years is all that can reasonably be expected.

Another interesting event was the presentation of awards by the ASM as follows: Medal for the Advancement of Research, to Charles E. Wilson, president, General Motors Corp.; Henry Marion Howe Medal to W. O. Binder and C. M. Brown, metallurgists, Union Carbide and Carbon Research Laboratories, Inc., and Russell Franks, chief metallurgist, Electro Metallurgical Co.; Past President's Medal to Harold K. Work, director, research division, College of Engineering, New York University (president of the Society in 1949-50); Albert Sauveur Achievement Award to Clarence E. Sims, assistant director, Bat-

(*Turn to page* 124, *please*)

Powdered Iron Blades For Gas Turbines

By Joseph Geschelin

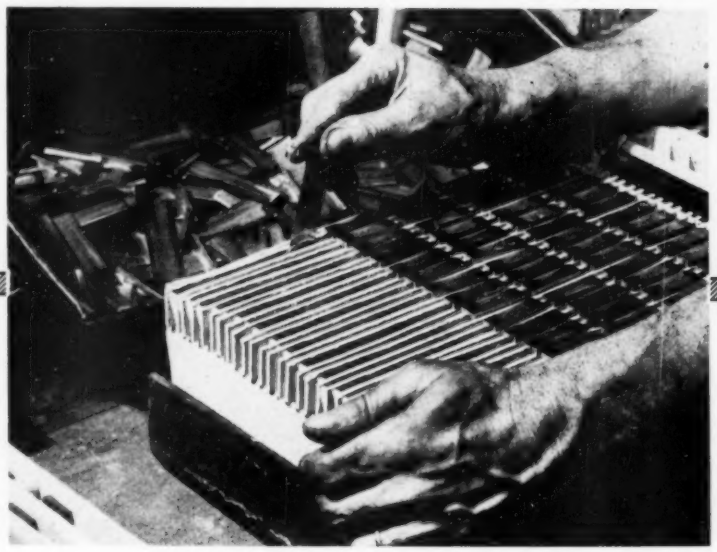
AMONG the major problems incident to the production of aircraft gas turbines is that of making turbine blades and vanes since they are quite intricate and are required in enormous quantity. Thompson Products, Inc., has given considerable attention to the problem and has in production seven different and basic methods for producing these vital parts.

One of the most promising techniques is that of powder metallurgy, using iron powder. From the standpoint of military urgency the process has the advantage of using little critical materials and employing only light manufacturing equipment. As will be described here, the special technique developed by TP makes it possible to produce blades for axial-flow compressors with a minimum of machining and yet hold to close tolerance and surface finish.

The making of TP-1 blades and vanes employs well-known powder metallurgy procedures, modified by special techniques developed to suit the requirements of high physical properties. Powdered iron is molded to shape in suitable dies in a Bliss hydraulic press with a pressure of about 20 tons per sq in. The "green" compact then is sintered in a Westinghouse hydrogen atmosphere furnace at 2000 F.

Because of the precise airfoil contour of this blading, the sintered blades are coined in another Bliss press. It may be noted at this point that blading made by powder metallurgy presents a serious problem because of its complex form and more so because of the large change in section from the body of the blade to the root.

After coining blades are subjected to an unusual process—infiltration. As is well known, parts produced by powder metallurgy are quite porous. While this is an advantage in conventional parts, in the case of blading the requirements of high physical properties make it imperative to develop a dense and strong structure. Accordingly, it is necessary to fill all voids completely,



This close-up shows the method of loading blades into Inconel containers for the "infiltration" operation. The copper compact is placed over the flat edge after the blades have been positioned.

this being accomplished by the absorption of copper alloy largely by capillary action.

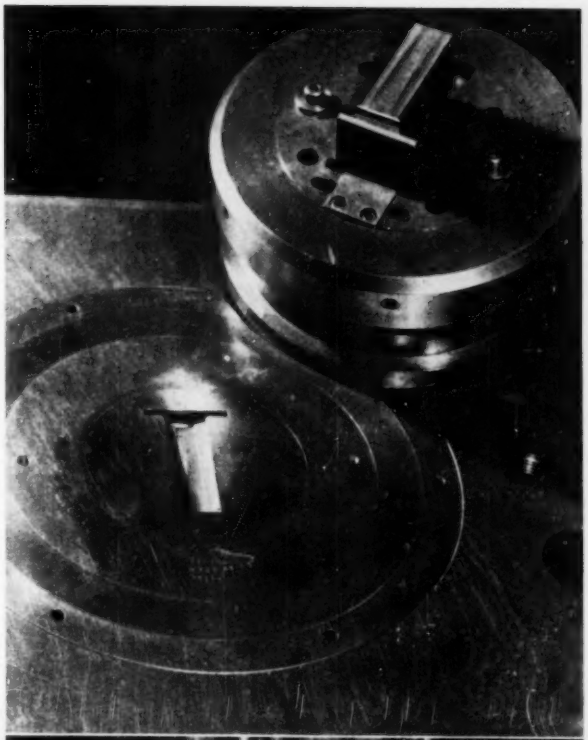
For this purpose compacts of copper alloy are molded in rectangular section about the length of the blade root and with sufficient volume to provide an excess over the material required to fill the voids. Blades then are assembled in an Inconel container designed to hold them accurately in position. They are inserted vertically with the root section at the top and are fitted with the copper compact.

The containers then are routed through a special hydrogen atmosphere Harper electric furnace for "infiltration," the work being held at around 2000 F. At this temperature the copper compact melts and the metal flows downward through the blade and is absorbed in the voids. Following this operation the blades are straightened in special dies in a Bliss hydraulic press.

The parts now are degreased, given a solution heat treatment, again degreased, and straightened for a second time. This is followed by Zyglo inspection, then grinding and blending. The final operation is precipitation hardening in Leeds & Northrup furnaces.

All blades are given a final X-ray inspection. Latest development is a special electroplating procedure—copper-nickel-chromium plating—to provide a corrosion-resistant coating. This coating is said to be superior to the corrosion resistance of the stainless steel alloys usually employed for blading.

(Turn to page 58, please)



Above: Close-up of upper and lower molding die assemblies. Note the sectional construction of the lower die to provide proper control of blade contour.

Right: TP-1 blades are molded from prepared iron powder in this 250-ton Bliss hydraulic press.

Seven Countries Represented

Paris

By W. F. Bradley
Special European Correspondent for
AUTOMOTIVE INDUSTRIES

Paris, France

WITH 1100 exhibitors occupying a floor area of 730,000 sq ft, the 1950 Paris Automobile Show was the largest and one of the most successful ever held. Originally strongly national, it has become the most international of the European exhibitions, with foreign firms outnumbering those of France. In the passenger car section there were 15 French makes, against 14 English and as many Americans. Considering the show as a whole, for it included every type of vehicle, the numbers were 36 French, 19 American, 18 English, four Italian, eight German, two Czech and one Spanish.

Because of the great demand on space and the desire to hold one single show and not separate passenger car and truck exhibitions, it was found necessary to add to the Grand Palais, in the Champs Elysées, two separate halls on the western edge of the city, one for all types of commercial vehicles and the other for motorcycles, bicycles and their accessories. A bus and subway service linked up the two. Paris appears to be recognized as the best distributing center in Europe, which explains the strong British representation, the inclusion of the entire Italian industry, and all of the German firms which

Rear engine Renault convertible.

This Talbot is equipped with a special custom built body.

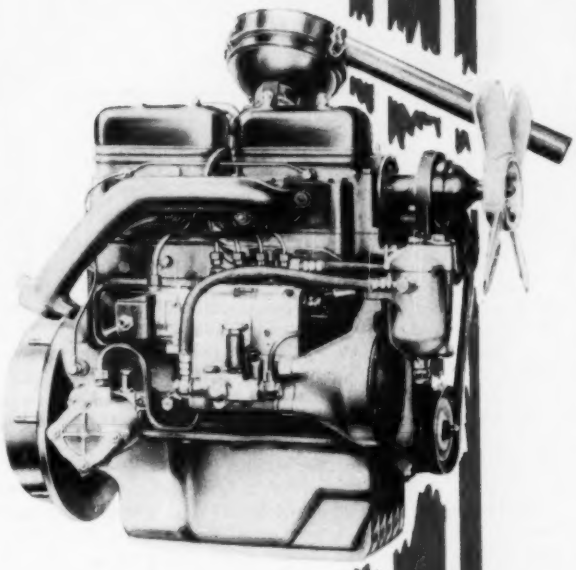
at the

Automobile Show

are back into production. There are restrictions on the direct importation of automobiles into France, but an important volume of business is being transacted with persons having dollar credits, and sales are being made for re-export to other countries.

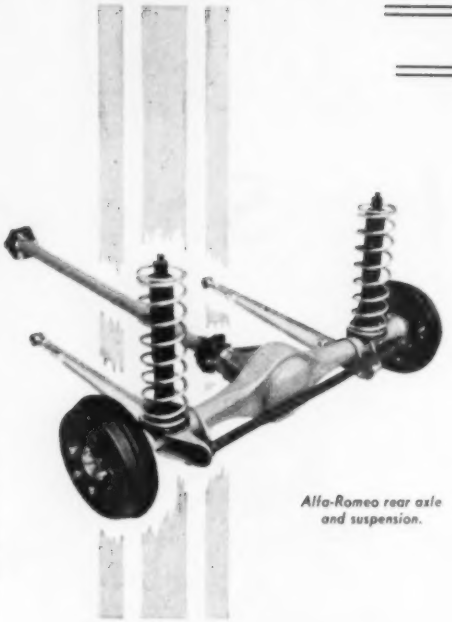
Although French production has considerably increased during the last two years, rising to 285,641 for 1949 and 168,523 for the first six months of the year, it still is insufficient to meet demands. Citroen's deliveries are 22 months late, Renault delivers in 12 to 18 months, Peugeot's limit is one year, Simca's is eight months, Panhard's five to six months, and Ford's four to five months. There is also a shortage of tires, which is partly due to a strong natural demand on the part of the public, to speculative buying, and to strikes at the Michelin factory which stopped all production there for two months.

Practically no new models have been produced by the French factories for in all cases they are just getting into full production on their postwar types. Citroen, with probably a longer waiting list than any French maker, has limited changes to minor details, mostly dealing with body fittings. The cheap two hp, air-cooled flat twin which was uncovered for the first time last year, is naturally unchanged, but a light delivery van has been added to the series, with engine size increased to 26 cu in. At present output is 30 to 40 per day, whereas the plant being laid down provides for 300 or more per day.



Mercedes-Benz small Diesel.

Triumph roadster.



Alfa-Romeo rear axle and suspension.

Renault, now producing more than 400 per day of its four hp rear engine cars, has a total daily output of 680 automobiles of all types, compared with 440 last year, and aims at 1000 per day in the near future. The bore of the rear engine has been slightly reduced to fit it into the 750 cc class. There are no other technical changes, but six body lines are now presented. An entirely new line has been added, known as the "Colorale" the output of which is expected to be 150 per day within a few weeks. The "Colorale" series is on standard lines. With a wheelbase of 104 in. it has a four cyl, L-head engine of 3.35 by 4.14 in. bore and stroke, a four speed transmission with gear shift under the steering wheel, a spiral bevel rear axle, semi-elliptic springs front and rear, an I-beam front axle and hydraulic brakes. This is the only passenger car on the French market without independently sprung front wheels.

Panhard is continuing the front-wheel drive with a flat twin, air-cooled engine which has met with considerable success since it was placed on the market. The latest model has had the bore increased, bringing the piston displacement up to about 45 cu in.

Simca, operating under Fiat license, continues two models, a six hp and an eight hp to which have been added a sports model.

Ford is getting into full production on the "Vedette."

Peugeot's line is a single chassis, the "203" introduced a year ago, and now being produced at the rate of 300 per day. With the same mechanical units—for this is an integral body-frame design—five different models are produced.

Hotchkiss has adopted the Gregoire design, which features a light-alloy flat four engine with front wheel drive, and extensive use of light alloy in both the chassis and the body. The latest type sedan was shown. In the meantime production is continuing on the original Hotchkiss six cylinder models, together with a light truck. In the high-priced category, Delahaye, Delage, and Talbot showed nothing more than slight mechanical changes.

This year the entire Italian industry is represented. Fiat displayed the 1400 and Lancia its six-cyl V with the transmission unit at the rear. Alfa Romeo has come out with an entirely new car, the "1900," with a four-cyl double overhead camshaft engine of 3.25 by 3.47 in. bore and stroke. With a compression ratio of 7.5 to one, it has an output of 80 hp at 4800 rpm. Weight of the four door six-passenger sedan is 2310 lb. The engine is on the same general lines as the six-cyl Alfa Romeos, with a five-bearing crankshaft, inclined valves mounted in a light-alloy head, with two overhead camshafts driven by a roller chain. The aluminum pistons have one chrome plated compression ring and two scraper rings. The single plate clutch is followed by a four speed synchromesh transmission of unusually small dimensions. A feature of this is an extension of the primary shaft in a housing, the rear of this housing constituting the third point attachment to the body.

Front suspension is by unequal length support arms and vertical coil springs, assisted by telescopic shock absorbers. The rear axle is of the rigid type, with anchorage by two rubber bushed light alloy radius arms and suspension by vertical coil springs.

With the notable exception of Nuffield, practically the entire British automobile industry was represented at the Paris show. There was, however, only one entirely new model, this being the Triumph two-three passenger roadster, shown here before it had been presented to the British public. The Triumph roadster can be converted almost instantly into a closed cabriolet. Its engine is a four cylinder of 3.35 by 3.62 in. bore and stroke. The clutch is a Borg & Beck nine in. unit and a synchromesh transmission provides three forward speeds and reverse, and has embodied with it a De Normanville overdrive unit. A feature of the body is the double skin light alloy construction. The headlights are concealed in the fenders, but the flush fitting caps are swung down between the two skins by electric control. The same applies to the top, which normally is completely out of sight under a flush-fitting pivoting metal deck panel. The panel is opened and the top erected by an electro-hydraulic system.

Germany was represented by six firms. In addition to the Volkswagen, Dr. Porsche, the designer of this car, presented his own automobile as a sports model. The flat four-cyl, air-cooled engine was reduced in size to 72 cu in., to fit it into one of the recognized sporting classes, the compression was increased, timing was altered and two carbureters were fitted. Two body

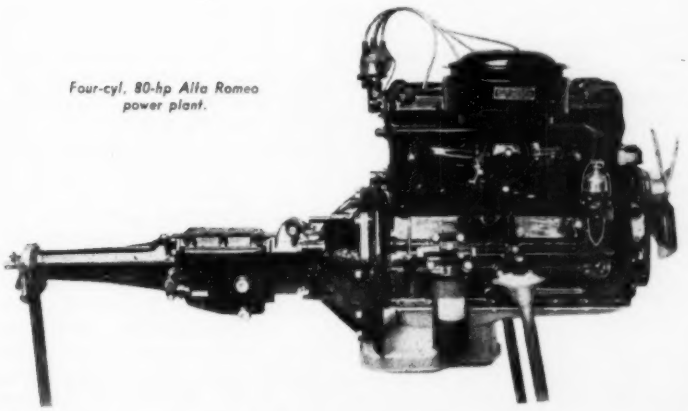
New four cyl Alfa Romeo sedan.

styles were presented; an open roadster and a sportsman's sedan.

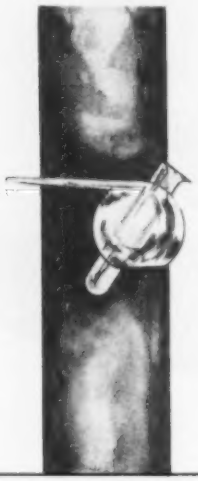
Mercedes-Benz, now in production at Stuttgart, is specializing in a four-cyl Diesel of only 103 cu in. in a passenger car, probably the smallest heavy oil engine used on private cars. The horsepower of this 17-D is now 40, compared with 45 for the gasoline engine of the same size and with which it is interchangeable. It is claimed that the Diesel is now equal to the gasoline model in acceleration, maximum speed and, except at very low speeds, in silence. General lines of construction remain as before the war, with refinements in body construction.

Gutbrod showed a cabriolet with a two-cyl, two-stroke water cooled engine driving the front wheels. Features were a tubular backbone frame, swinging arms at the rear with coil spring suspension, and rack and pinion steering. In the bigger class Borgward Hansa presented a 91.5 cu in. four-cyl model in a central backbone chassis forked in front to receive the engine and splayed at the rear to carry the transverse leaf suspension and the suspended differential housing. Opel (General Motors), now Germany's biggest producer, presented two models.

(*Turn to page* 122, *please*)



Four-cyl, 80-hp Alfa Romeo power plant.



The Importance of Products

By C. L. McCuen
General Manager, General Motors
Research Laboratories Division

256 Chemical Products
Used Directly or Indirectly in the Automobile Industry

Abrasives	Ceramic materials	Gold	Oxygen	Sodium phosphate
Acetic acid	Charcoal	Graphite	Paint	Sodium silicate
Acetylene	China wood oil	Gray iron	Paper and pulp	Sodium stannate
Adhesives	Chromic acid	Hydrochloric acid	products	Sodium stearate
Alcohol	Chromium	Hydrofluoric acid	Paraffin	Sodium sulphate
Alloy steels	Chromium oxide	Hydrogen	Para nitraniline	Soldering fluxes
Alkyd resins	Chromium sulphate	Hydroquinone	Petroleum	Solvents
Aluminum	Chlorine	Iron oxide	Petroleum naphtha	Stannous chloride
Aluminum hydrate	Chloroform	Isobutyl acetate	Pig iron	Starch
Aluminum oxide	Citric acid	Isobutyl alcohol	Pigments	Stearic acid
Aluminum sulphate	Clay	Isopropyl acetate	Phenol	Strontium chloride
Ammonia	Coal	Isopropyl alcohol	Phosphoric acid	Sugar
Ammonium sulphate	Coal tar	Lacquers	Phosphorus	Sulphur
Amyl acetate	Coated fabrics	Lead	Plaster of Paris	Sulphuric acid
Amyl alcohol	Cobalt	Lead acetate	Plasticizers	Synthetic resins
Animal fat	Cocanut oil	Lead oxides	Plastics	Synthetic rubber
Antioxidants	Coke	Lead sulphide	Platinum	Talc
Antimony	Copper	Lead sulphate	Polish	Tallow
Arsenic	Copper cyanide	Lead tetraethyl	Polishing compounds	Tannic acid
Asbestos	Copper sulphate	Lime	Porcelain	Tanning materials
Asphalt	Cotton	Limestone	Potassium chromate	Tar
Baking enamel	Cottonseed oil	Linseed oil	Pumice stone	Tartaric acid
Barium	Cracking catalysts	Litharge	Rayon	Thinners
Barium carbonate	Cresol	Lubricating oils	Reclaimed rubber	Thorium
Barium chloride	Cyanides	Magnesia	Resin	Tin
Barium sulphate	Dextrin	Magnesium	Rouge	Tin chloride
Basic lead carbonate	Detergents	Magnesium carbonate	Rubber	Titanium
Basic lead sulphate	Dibutyl phthalate	Magnesium phosphate	Salt	Titanium oxide
Benzene	Disodium phosphate	Malleable iron	Salt cake	Toluene
Beta naphthol	Dyes	Manganese	Sand	Top material
Boric acid	Emery	Manganese chloride	Shellac	Tricresyl phosphate
Borax	Ether	Mercury	Silica	Trisodium phosphate
Bromine	Ethyl acetate	Methyl alcohol	Silicon	Tungsten
Butyl acetate	Ethyl alcohol	Mica	Silicon carbide	Tungsten carbide
Butyl alcohol	Ethyl butyrate	Molybdenum	Silver	Tungstic acid
Butyl propionate	Ethyl lactate	Molybdic oxide	Silver cyanide	Turpentine
Cadmium	Ethylene bromide	Monel metal	Soap	Upholstery leather
Cadmium cyanide	Ethylene chloride	Mono sulphonic acid	Soda ash	Vanadium
Cadmium oxide	Ethylene glycol	Nickel	Sodium	Waxes
Cadmium sulphide	Fats and Oils	Nickel ammonium	Sodium acetate	Wetting agents
Calcium carbide	Ferric chloride	sulphate	Sodium bichromate	White lead
Calcium carbonate	Ferric sulphate	Nickel carbonate	Sodium carbonate	Whiting
Calcium chloride	Ferrous sulphate	Nickel chloride	Sodium chlorate	Wood products
Calcium sulphate	Fluorspar	Nickel sulphate	Sodium chloride	Wool
Carbon and Carbon	Formaldehyde	Nitric acid	Sodium cyanide	Xylene
black	Fuel oil	Nitrocellulose	Sodium disulphite	Zinc
Carbon dioxide	Gas	Nitrogen	Sodium ferrocyanide	Zinc cyanide
Carbon steel	Gasoline	Nylon	Sodium hydroxide	Zinc oxide
Castor oil	Glass and Glass	Oleic acid	Sodium nitrate	Zinc stearate
Caustic soda	products	Organic accelerators	Sodium nitrite	Zinc sulphate
Celluloid	Glue	Ortho toluidine	Sodium perborate	Zinc sulphide
Cellulose acetate	Glycerine	Oxalic acid	Sodium peroxide	Zirconium

WHILE the automobile may not be a direct product of the chemical industry, it does have fundamental chemical problems in every phase of the business from the raw materials used in its production to the gasoline which is burned to propell it on the roads. The automobile industry is also one of the largest customers of the chemical industry. Almost all of the chemical elements go into its vehicles and even some of the new radioactive elements give promise of becoming important laboratory tools. Some time ago a partial list of chemical products used directly or indirectly in the automobile industry was compiled, Table 1. While it is no doubt incomplete, it does show the wide range of chemical products from A, abrasives, to Z, zirconium, upon which the industry depends. This means that any new development in the chemical industry may, and most likely does, have a possible use in the automobile industry.

The 28 most important materials which are in a representative 1950 model four-door sedan are shown in Table 2. It indicates the many chemical problems involved in the car's production. The amounts vary from an eighth of an oz of tungsten to over 2500 lb of steel. When these values are multiplied by the pres-

# of Chemical to Automobiles

Pounds of Material

1950 Four Door Sedan
Car Weight—3824.12 pounds

STEEL	2556.29	TIN	1.37
GRAY IRON	521.15	FABRIC	92.26
MALLEABLE IRON	99.60	GLASS	76.28
ALUMINUM AND ALLOYS	11.39	LUBRICANTS	15.16
COPPER	25.99	PAPER	55.05
COPPER ALLOYS	15.61	RUBBER COMPOUND	205.63
LEAD AND ALLOYS	30.39	SOUND DEADENER	10.83
ZINC AND ALLOYS	66.06	PLASTIC–THERMO SETTING	2.38
ANTIMONY	1.12	PLASTIC–THERMO PLASTIC	2.87
CHROMIUM	6.06	TUNGSTEN	.008
MANGANESE	18.82	ASBESTOS	2.60
MOLYBDENUM	.08	CORK	.626
NICKEL	1.06	MICA	.102
SILICON	17.35	VANADIUM	.0016

ent annual output of over 6,000,000 vehicles, it emphasizes the large market for chemical products which the automobile industry represents. Over 22 billion lb of these materials are used in the production of a year's volume of cars.

These figures show what an important part the availability of a new material in large amounts plays in its acceptance for automotive use. For instance, the table shows that a typical car uses over five lb of various plastics. This year that will mean over 30,000,000 lb consumed by the automobile industry, which is no small order for the chemical industry to supply.

But the largest chemical factors of all upon which the automobile industry depends are the problems involving fuel, a field in which it depends upon cooperation with the chemical industry for solution. A representative 1950 automobile which weighs a little over 3800 lb burns 4200 lb of gasoline per year. In its lifetime on the road it will consume almost 12 times its own weight in fuel.

In order to demonstrate the dependency of the automobile industries on the chemical industry, Table 3 summarizes 26 automotive subjects which involve chemical problems.

The entire engine development program is dependent upon the solution to the chemical problems of high octane fuels, engine deposits, lubricant additives, ceramic development, and new properties in materials. The automatic transmission program brings with it new requirements in hydraulic fluids. There are chemical problems in all materials of construction; metals, rubber, plastics, finishes, plating, glass, fabrics and (*Turn to page* 100)

Subjects for Chemical Problems in the Automobile Industry

FUELS
HIGH OCTANE FUELS
ENGINE DEPOSITS
SYNTHETIC FUELS

ENGINES
ENGINE LUBRICANTS
BEARING MATERIALS
SPARK PLUG CERAMICS
ANTI-FREEZES

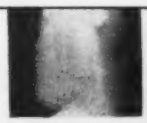
METALS
HEAT RESISTING ALLOYS
WEAR RESISTING ALLOYS
CORROSION
FRETTING CORROSION
ELECTRO-PLATING
SUBSTITUTE MATERIALS
RAW MATERIAL SOURCES

CHASSIS
GEAR LUBRICANTS
TRANSMISSION FLUIDS
BATTERIES

FINISHES
FINISHES
THINNERS AND SOLVENTS
CLEANING COMPOUNDS

SYNTHETICS
PLASTICS
ADHESIVES
SYNTHETIC RUBBER

MATERIALS
RUBBER
GLASS
FABRICS



Blast Cleaning of Forgings Reduces Stream Pollution

By Joseph Geschelin

ALTHOUGH the newly introduced Pangborn "Continuous-Flo" Rotoblast machine is designed for cost reduction in large cleaning departments and is intended primarily to replace multiple batch type blast cleaning units, at Buick it has fitted perfectly in the current program of reducing stream pollution. Up to recently, *i.e.*, before the installation of the 54-in. barrel machine to be described here, Buick cleaned practically all forgings by pickling.

While pickling is an old established art in forging shops, it requires the use of a considerable volume of acid with its attendant disadvantage of disposal of pickling waste. For a number of years General Motors divisions have been considering ways and means of cooperating with their communities in the interest of eliminating contaminants that contribute to stream pollution and Buick now has found it possible to materially reduce pickling waste by the introduction of this new technique.

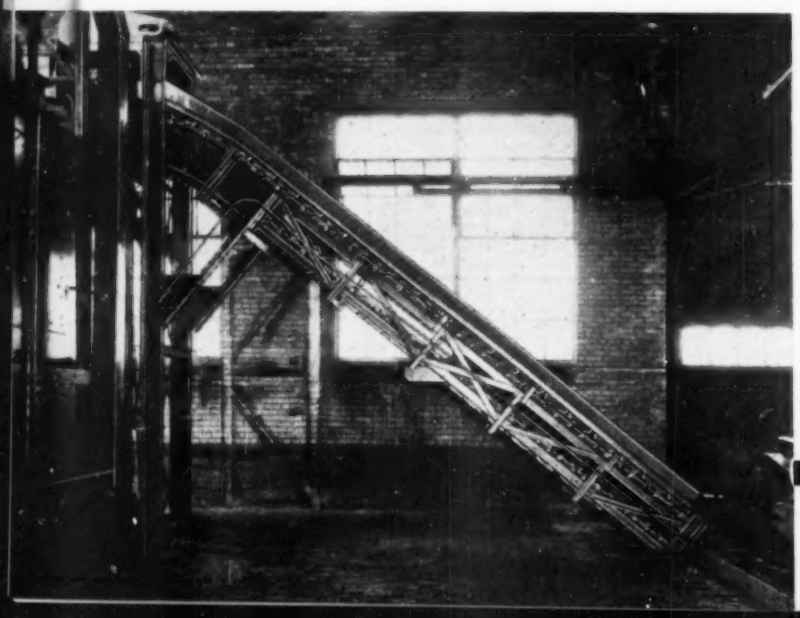
As a matter of fact, considering the entire forge shop operation, Buick now processes all small forgings through the Pangborn machine. The only parts still requiring pickling treatment are the big pieces such as crankshafts, camshafts, and lower control arms. There is a possibility that even the larger forgings can be shot-blasted in a 72-in. machine.

At the present writing, therefore, it has been possible to reduce pickling to a minimum. And in the near future it may be entirely eliminated.

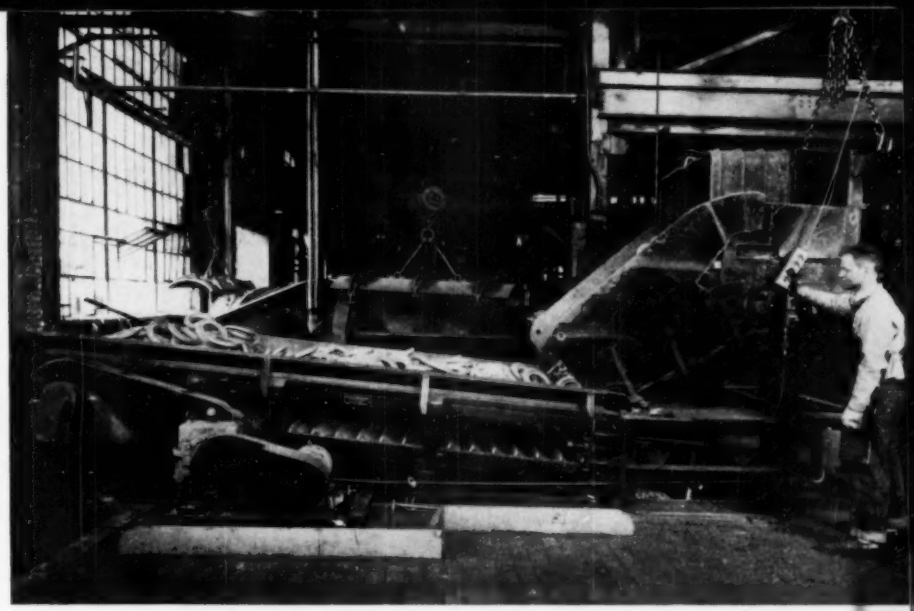
The Continuous-Flo installation illustrated here offers two major advantages at Buick. The first is the elimination of pickling and the consequent reduction in stream pollution; the second is a tangible reduction in overall cost economy as compared with pickling.

Looking at the installations, it will be noted that the blast unit is integral with the flight conveyor—the charging conveyor. At right angles to the charging conveyor is the loading conveyor, an independently driven section timed to operate intermittently. It is considerably wider, designed to accommodate the dumping of full loads of forgings. Consequently, it serves as a storage conveyor and aids in distributing the load uniformly on the charging conveyor.

At the discharge end is a wide belt conveyor which



Rotoblast charging conveyor, an integral part of the machine, is a flight conveyor designed to feed forgings directly into the barrel. It picks up rough forgings at floor level at the extreme right, the material being fed onto the conveyor by the loading conveyor unit.



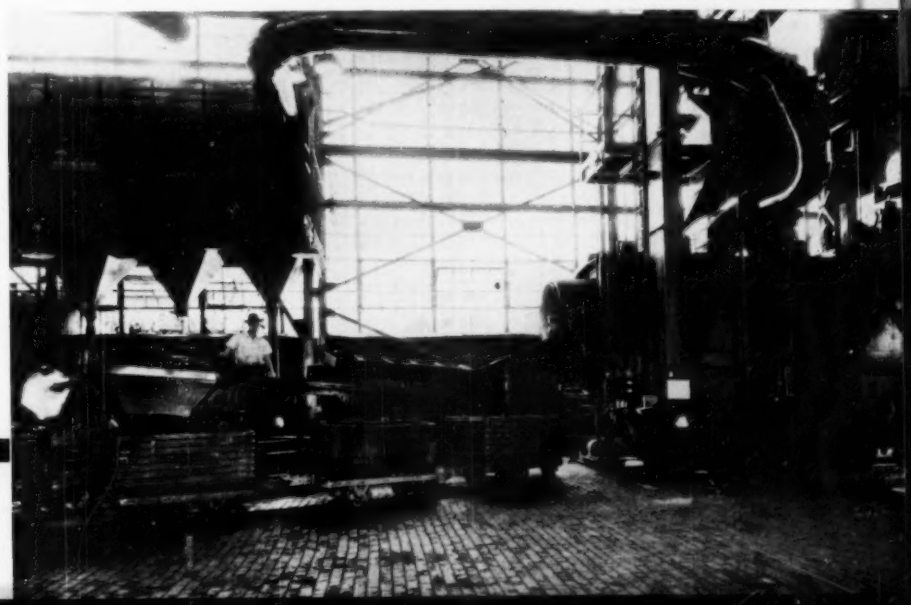
The loading conveyor for the Rotoblast is seen here feeding rough forgings to the charging conveyor at the extreme left. This is an independently operated unit, designed for intermittent operation.

takes the finish cleaned forgings from the barrel, transports them to the terminal end where they are dumped into tubs, ready for delivery to the machine shops.

The 54-in. machine has a nominal rated capacity of 10 tons of forgings per hour. Its actual performance, however, depends entirely upon the nature of the scale to be removed. Tight, adherent scale resulting from normalizing operations may reduce capacity considerably. In the current operation, output has exceeded the nominal rating and as much as 17 tons per hr has been handled satisfactorily while an average of 12 tons per hr has been maintained consistently.

It is of major interest that in keeping with Buick practice the shot used in this machine is cut wire of 0.054 in. size. With regard to economy, it must be noted that the unit has been in operation only a few months so that initial cost figures necessarily are subject to change with time and experience. Currently, the usage of shot has run around 1.17 lb of shot per ton of forgings as an average. Moreover, the cut wire

(*Turn to page* 106, *please*)



Installation of new 54-in. Pangborn Continuous-Flo Rotoblast in the Buick forge shop at Flint. To the left in this view is the belt type discharge conveyor which takes cleaned forgings from the discharge end of the machine and loads them into tubs at the extreme left. The large dust collector serving this equipment may be seen overhead at the extreme left.

Vehicle Registrations Will Pass 48 Million

By Marcus Ainsworth

FOR six consecutive years registrations of motor vehicles in the United States have shown a marked increase each year and during the past four years, including 1950, new records have been established each year. From a low of slightly under 30,000,000 vehicles registered during 1944, registrations of cars, trucks and buses by the end of 1950 will have reached the new all time high point of slightly over 48,000,000, an increase of a little more than 18,000,000 vehicles in six years.

We estimate that 48,057,945 cars, trucks and buses will have been registered by the end of the 1950 registration year, an increase of 9.5 per cent over the 43,876,732 vehicles registered during 1949. Passenger car registrations will

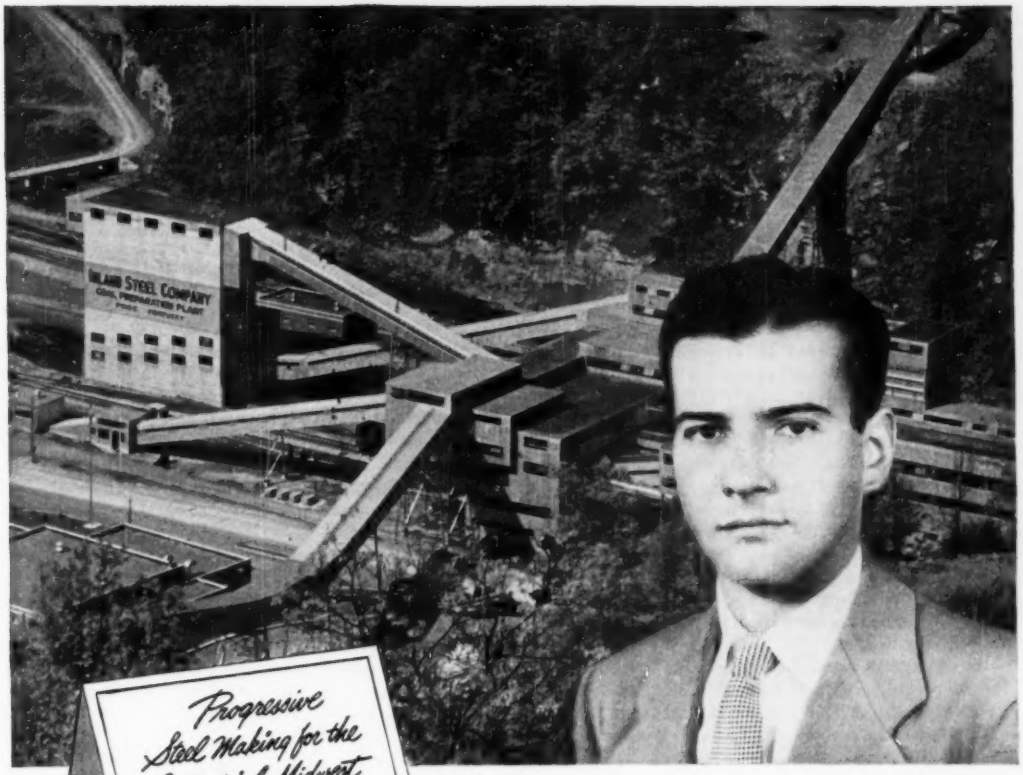
(*Turn to page 58, please*)

Forecast of 1950 Motor Vehicle Registrations

As of the End of the 1950 Registration Year

	Passenger Cars(1)		Trucks		Buses		Total Motor Vehicles		Per Cent Increase
	1950	1949	1950	1949	1950	1949	1950	1949	
Alabama	464,510	408,261	151,700	136,082	1,816	2,038	618,026	546,381	13.12
Arizona	196,185	180,869	56,000	52,978	680	945(1)	252,865	234,792	8.00
Arkansas	310,860	281,253	130,000*	121,413*	3,235*	1,201*	444,095	403,867	9.98
California	3,738,300	3,404,881	612,800	559,389	(2)	6,911	4,351,100	3,971,141(4)	9.57
Colorado	416,900	383,140	134,700	124,709	(2)	(2)	553,600	507,849	9.01
Connecticut	983,920	539,755	85,500	77,716	3,100	2,770	682,520	620,251	10.04
Delaware	93,800	72,535	22,000	17,882	(2)	(2)	115,800	90,317	28.21
District of Columbia	182,000	151,787	18,700	18,389	2,000	2,113	182,700	172,289	6.04
Florida	902,000	698,382	176,500	165,367	3,500	3,785	982,000	867,474	13.20
Georgia	690,000	614,299	180,000	178,479	5,000	4,900	875,000	797,678	9.69
Idaho	192,275	174,058	70,500	64,137	(2)	14	262,775	238,209	10.31
Illinois	2,286,000	2,079,563	350,000	336,174	.....	.....	2,616,000	2,414,757	8.33
Indiana	1,187,000	1,090,153	245,000	206,154	8,000	7,653	1,440,000	1,303,960	10.43
Iowa	880,000	806,540	180,000	168,303	(2)	(2)	1,060,000	973,843	8.84
Kansas	650,500	618,965	203,800	195,448	(2)	(2)	854,300	814,414	4.90
Kentucky	591,000	527,717	173,500	164,941	(2)	(2)	764,500	692,658	11.99
Louisiana	553,850	489,526	148,000	140,901	3,600	3,576	703,450	613,103	14.74
Maine	203,175	186,771	63,000	59,894	420	417	266,575	247,082	7.89
Maryland	573,700	510,800	97,500	92,200	4,000	4,250	675,200	607,250	11.19
Massachusetts	1,095,000	1,010,185	165,500	153,206	5,365	5,822	1,265,885	1,169,215	8.27
Michigan	2,137,500	1,913,894	295,900	270,309	(2)	(2)	2,433,400	2,184,983	11.42
Minnesota	941,000	875,538	186,000	182,532	3,200	371	1,132,200	1,058,441	6.97
Mississippi	302,200	276,041	143,500	123,954	5,800	3,894	451,500	403,889	11.79
Missouri	1,013,000	943,839	257,000	237,458	5,000	4,850	1,275,000	1,185,947	7.51
Montana	185,000	163,991	79,000	76,476	(2)	(2)	264,000	240,467	9.79
Nebraska	450,000	420,896	123,300	119,473	515	886	574,515	541,225	6.15
Nevada	65,000	52,175	15,000	14,811	(3)	(3)	70,000	66,786	4.81
New Hampshire	132,500	125,803	32,000	36,214	(2)	(2)	164,500	162,017	1.53
New Jersey	1,329,800	1,208,787	211,300	199,920	5,780	10,689	1,546,860	1,419,396	8.96
New Mexico	188,000	148,149	38,000	32,564	1,000	1,015	227,000	199,728	13.6
New York	3,114,300	2,825,041	435,500	493,868	11,100	11,513	3,560,900	3,330,422	6.92
North Carolina	831,500	713,195	201,600	177,742	8,000	8,708	1,041,180	899,645	15.72
North Dakota	190,000	179,535	82,000	77,804	94	95	272,094	257,434	5.69
Ohio	2,400,000	2,184,808	338,000	304,901	4,000	11,008	2,739,000	2,500,818	9.53
Oklahoma	622,600	566,902	210,000	163,435	6,500	6,200	839,100	748,627	12.08
Oregon	560,800	496,326	136,800	123,897	1,570	1,192	699,170	621,415	12.51
Pennsylvania	2,544,900	2,344,192	475,000	452,867	12,200	12,338	3,032,100	2,809,397	7.93
Rhode Island	219,000	201,131	31,000	30,181	600	616	250,600	231,928	8.06
South Carolina	447,500	395,870	111,460	100,633	5,000	4,369	563,960	500,872	12.60
South Dakota	211,400	202,249	69,000	68,056	318	310	280,715	269,215	4.27
Tennessee	586,600	569,326	160,000	153,177	3,000	2,800	759,600	725,306	4.73
Texas	2,330,700	2,045,543	615,950	549,520	13,500	12,944	2,960,150	2,608,007	13.50
Utah	198,500*	177,167	46,500	42,308	425	629	245,425	220,104	11.50
Vermont	105,000	88,332	15,400	15,023	163	171	120,565	114,529	5.27
Virginia	794,100	671,232	188,500	183,616	5,000	4,578	927,600	829,726	11.80
Washington	751,800	679,149	155,000	152,980	6,400	6,290	913,200	838,409	8.92
West Virginia	351,400	296,537	100,000	96,831	1,300	1,235	452,700	394,603	14.72
Wisconsin	930,000	895,175	219,800	210,069	2,600	2,295	1,156,400	1,107,509	4.00
Wyoming	99,200	95,206	37,000	35,360	.....	.....	136,200	130,564	4.32
Total	39,642,875	35,962,489	8,271,210	7,758,842	143,860	158,421	48,057,945	43,876,732	9.53

(1) Includes taxicabs. (2) Included with trucks. (3) Included with passenger cars.
(4) Does not include 122,461 passenger cars and 7,589 trucks originally registered in other states.
* Due to change in registration period for trucks and buses, these figures represent registrations for six month period only.



"WE GIVE OUR COAL A BATH

to improve our steel!"

"I'm Dick Jimenez, Preparation Engineer at Inland's new coal preparation plant in Price, Kentucky. Our job here is to provide a clean, uniform grade of coal with a low ash content for the Inland coke ovens. Poor coal...coal with varying degrees of slate mixed in . . . results in inefficient and undependable blast furnace operation. And today it's more important than ever that those blast furnaces be as productive as possible."

This coal preparation plant was recently put into operation as part of Inland's continuing program of modernization and expansion. This constant improvement of every phase of steelmaking is further evidence that Midwest steel users can put their confidence in Inland as a progressive and dependable source of steel in peace and war.

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Important Facts

About Our Supplies of Non-Ferrous Metals

THE assumption here is that there will be no shooting war after the cleanup in Korea, but that the arming of the country and of the Atlantic nations, including stockpiling, will proceed at the accelerated rate contemplated in the legislation passed by Congress. Our non-ferrous fabricating industries have the plant capacity to turn out enough products both for the expanded military program and for a high rate of civilian consumption. There are also unused facilities left over from the last war. Some Government plants built for specific military purposes, but unneeded in recent years, have been maintained in "mothball" readiness for another extreme emergency. Most companies meanwhile have expanded their capacity for peacetime production and improved plant and equipment. Technical research has added to the quality and diversity of products.

As an example of productive capacity, we might cite the copper industry. Fabricators in August of this year consumed 137,000 tons of copper, or at the rate of 1,644,000 tons a year. This rate was approximately that of 1943 and 1944, our biggest war years for copper consumption by fabricators. Considering that the pattern of wartime production is in the heavier gages, it is clear that our capacity to produce under emergency circumstances is far above that of the last war, perhaps as much as 25 per cent higher, or at the rate of 2,000,000 tons a year, without use of idle Government plants.

By C. Donald Dallas

Chairman of the Board
Revere Copper and Brass, Inc.

Effect of Copper Prices

In fact, wherever we look among the industries of this non-ferrous group, we find that the limiting factor in the period ahead will not be capacity to fabricate metals or manufacture finished products, but the availability of the raw metals. It is often said that higher prices for copper will encourage more mining. Such statements are misleading and contrary to the facts. These are:

FIRST—That the production of marginal, high-cost copper mines adds only very slightly to the sum total of available metal, and, in any event, most of the high-cost mines have been in production through the war and postwar period. The greatest domestic mine production of copper so far recorded was in 1943, when the total was 1,114,149 tons. The seven largest producers accounted for over 1,000,000 tons of this whereas 210 small mines, many of them aided by direct Government subsidies, produced only 83,000 tons. There is no hope that even present high prices, which have stimulated overall production somewhat, will provide any important contribution to the supply of available metal.

SECOND—It takes as much as five years to bring a new copper mine into production, and surely not less than three years even under emergency conditions, when ordinary economies are ignored. There are few bodies of copper ore awaiting development in this country. We hear of the San Manuel mine in Arizona. This is usually described as the largest undeveloped copper reserve in the United States. It is still many years and 50 millions of dollars away from becoming a real factor in the U. S. copper production. The same is true of the White Pine area in Michigan.

The only nearby increases to be expected in copper production abroad will be from African sources. These should increase the world's supply of the metal by an additional 6000 tons a month beginning in 1951, and by another 6000 tons in 1952.

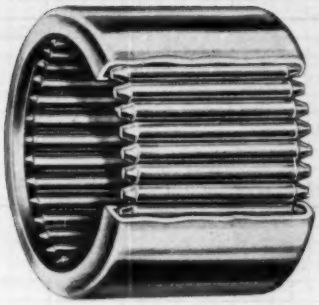
However, although we cannot expect increases in copper supply to correct the current shortage of the metal, the situation is by no means so serious as it appears. Let's look at what has happened this year.

Stimulated by the abnormal demand since the Korean episode and the imposition of the copper tariff, prices have risen and deliveries to customers have depleated stocks of both producers and fabricators. Producers' stocks have been reduced between Jan. 1, 1950 and Aug. 31 by 65,000 tons, leaving less than two weeks' supply—an irreducible minimum. Fabricators' stocks meanwhile had declined by 49,000 tons and are well under the 90-day stock considered normal in this business.

The rise in price was from a low of 16 cents in 1949 to a nominal—or more accurately a fictitious—figure of 24½ cents. How unreal this price is may be judged from the fact that recently over 30 cents a pound has been paid in the gray market. This is inflation, and the victims are all of us who need copper in our factories, or who buy copper products in the market place. This decline in stocks, and the rise in price, was in the face of rising supply and no clearly defined actual increase in needs.

(*Turn to page 96, please*)

a stickler for accuracy



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TORRINGTON *NEEDLE* BEARINGS

AIRBRIEFS

By ROBERT McLARREN

Super Missile Agency

Appointment of K. T. Keller, Chrysler president, as Director, Office of Guided Missiles in the Department of Defense, brings into Government service another brilliantly qualified industrial executive—but he may have stepped into a beartrap. Creation of this super missile agency is the latest in a long and complex history of solutions, both good and bad, to the problem of guided missile research and development administration. The three services have wrangled interminably among themselves over "cognizance" privileges in the guided missile field, easily one of the most complex in modern science. More than five years have elapsed since the last Nazi V-2 missile was fired in anger and yet this most progressive of technical nations still has no missile its equal.

While the easy answer to this enigma, given by officers, is that the United States has not tried to produce a super-V-2, the fact remains that with only isolated exceptions, the U. S. arsenal of guided missiles is still in the research laboratory, where every indication is that it will remain for years to come. While the obvious conclusion to draw from Mr. Keller's appointment is that a production job is to be done, such is far from the case. Only the Fairchild Lark and the Martin Matador are currently in production and these are wholly service test pilotless aircraft.

Technical Complexity

The problem lies in the enormous complexity of the guided missile as a weapon. In theory, at least, it must assume the jobs now being done by bombers, interceptors, anti-aircraft guns, field artillery, and battleship batteries—and do all these jobs with greater accuracy and extended range! Accuracy is always improved by speed, and most guided missiles are supersonic aircraft, and, therefore, subject to the manifold problems and time-taking reseach inherent in this field. Major problem—guidance—is essentially an electronic problem and all electromechanical systems are forever plagued with oscillations and harmonic difficulties that most cures serve only to create additional problems. Gyro-stabilized mechanical guidance systems depend upon initial settings for their ultimate performance, creating broad possibilities of error. Star tracking and target-seeking (heat, light, radar, etc.) guidance systems afford the designer only the most minuscule signals and forces with which to work, demanding large amplifications with their attendent difficulties. It is the scientific complexity of the field, rather than interservice bickering that has restricted this nation's program to its present rate-of-progress and its administration demands scientific insight and technical perspective rather than the "head knocking" type of rule-by-fiat through control of budgets. None will deny that the $200-million-annually field badly needs coordination and effective administration and it will be hoped by all concerned that Mr. Keller can display that fine compromise between professional sympathy and hard-headed realism that, alone, can crystallize and accelerate this vital program.

U. S. Jet Air Line Nears

If George T. Baker, National Airlines president, has his way about it, the first airline in the U. S. to fly a jet airliner will be his own. The plane—Canada's Avro Jetliner. Baker is completely "sold" on the idea and hopes to have a sample Jetliner on loan for testing at Miami in the next few weeks. The four-jet transport would cut the current Miami-New York schedule time of four hours down to about 2½ hours and give NAL a competitive advantage that few knowing customers could resist. The Jetliner, although currently laid up for overhaul and minor modification, is undergoing Canadian Department of Tranport certification testing and the Civil Aeronautics Administration has indicated that it will "go along" with this Canadian ticket, although a few flight tests might be necessary in this country. With an Approved Type Certificate, there appears few if any obstacles to very rapid production delivery, speedy route proving and actual scheduled operation within a year. In pointing out the maintenance savings provided by turbojet engines over the conventional piston type, Baker states that on a recent trip through the Rolls-Royce plant in England he saw 42 men in a 5000-sq ft room overhauling 20 Rolls-Royce Derwent turbojet engines a week, whereas in his own shop it requires 1200 men in a 40,000-sq ft area to overhaul the same number of piston engines per week. One thing appears certain, the moment National places the Jetliner contract, other major U. S. airlines will follow suit immediately, some for

(*Turn to page* 118, *please*)

Power failure can be a costly inconvenience in dollars, and even lives. The instant the main power fails, a SYNCHRO-START equipped standby generator set will go to work and get the generator on the line to provide emergency power. With most small engines, the plant will be on the line producing emergency power in five seconds or less—larger engines in proportion.

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Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

L-108 Oil Selection

Sun Oil Co.—A new 44-page booklet, Technical Bulletin B-4, covering fundamental information on hydraulic systems, maintenance, trouble-shooting, and selection of proper fluids is available. This edition features specially prepared phantom and cutaway drawings illustrating functions of basic types of valves, pumps, hydraulic motors, torque converters, etc.

L-109 Materials Handling Equipment

Clark Equipment Co.—A condensed catalog containing basic specifications of the firm's entire line of materials handling equipment has recently been published. Models listed include forklift trucks, both gas-powered and electrics, on solid tires and pneumatic tires; industrial towing tractors; tructractor models for handling bulk materials; and a complete line of twenty special attachments designed for particular needs.

L-110 Diesel Engines

The Buda Co.—Bulletin 1506, a 16-page, two-color catalog, describes the new Buda DA Dyna-Swirl Diesel engines especially designed for all types of heavy-duty trucks. Four pages are devoted to pictures and stories about installations of these engines in actual trucks.

L-111 Brazing

Handy & Harman—Just released is a new bulletin covering silver alloy brazing with Easy-Flo and Sil-Fos that tells where and how to use these alloys to the best advantage. Shows many interesting applications and describes fast brazing techniques.

L-112 High Temperature Oils

E. F. Houghton & Co.—Results of an extensive 18-month research program on high temperature lubrication form the basis of a new folder, "Hi-Temp Oils." This illustrated leaflet describes the testing procedure used by the company's research staff in setting up three series of Hi-Temp oils to meet high temperature conditions up to and even over 500 F.

L-113 Aluminum Production

Reynolds Metals Co.—A new booklet describing the production of aluminum pig by the Hall electrolytic reduction process at the firm's Jones Mills, Ark., plant. The electric reduction process for producing aluminum from alumina is explained and the equipment pictured.

L-114 Abrasive Grain

Simonds Abrasive Co.—Bulletin No. ESA-198 describes Borolon aluminum oxide abrasive grain for polishing operations. It contains abrasive grain size recommendations for typical polishing operations and includes detail on polishing wheel set-up data.

L-115 Automatic Lathe

Sundstrand Machine Tool Co.—A new folder describing the model 12A automatic lathe is available. Complete

(*Turn to page 60, please*)

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THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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Sealed Power has been "talking turkey" to the automotive industry since 1917. Because we have kept our pledges to you, you have kept us at the head of the field. Today, Sealed Power's facilities and staff have reached an all-time peak. You are urged to make full use of our resources to help make your good engines even better.

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PISTON RINGS · PISTONS
CYLINDER SLEEVES

Vehicle Registrations

(*Continued from page 50*)

number about 39,642,875 as compared with 35,962,469, a gain of 3,680,000 units or 10.23 per cent. Trucks and buses combined will total 8,415,070 as against 7,914,263 a year ago, an increase of 6.6 per cent.

These registration data are the result of an annual survey conducted by AUTOMOTIVE INDUSTRIES for the purpose of establishing a sound estimate of what may be expected in the way of registrations by the end of the 1950 registration year. Forty-six states and the District of Columbia cooperated with us in this survey, furnishing in most cases actual data to the end of September and their estimates for the remainder of the year. Experience over many years past has shown this annual forecast to be within a very close approximation of final returns which appear yearly in the Statistical Issue of AUTOMOTIVE INDUSTRIES.

On the basis of these returns, three states will show over three million vehicle registrations. California will lead with 4,351,000, New York will be second with 3,560,000 and Pennsylvania third with 3,032,000. In addition to these states with over three million registrations there will be twelve states with registrations between one million vehicles and three million. Texas will lead this group with 2,960,000 followed by Ohio, Illinois, Michigan, New Jersey, Indiana, Missouri, Massachusetts, Wisconsin, Minnesota, Iowa and North Carolina, in that order.

On a percentage basis Delaware will show the greatest gain over 1949 with 28.2 per cent, followed by North Carolina with 15.7 per cent. Louisiana and West Virginia will have the same percentage increase of 14.7 per cent. New Mexico, Texas, Florida and Alabama will all show over 13 per cent increase, while South Carolina, Oregon and Oklahoma will all have over 12 per cent gain over 1949. It is of interest to note that the most substantial gains have been made through the south and southwestern states, according to this survey.

The growth in registrations is at a considerably faster rate than the population growth, which is evidenced by the fact that fifteen years there were about 4.8 persons in the United States per vehicle while today there are about 3.1 persons per motor vehicle.

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- Turn signal switches
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Installed as original equipment on many popular-make motor cars, trucks and buses, Mitchell ignition switches are known for their sturdy construction and extra long life. "Radio" position available without extra cost.

Mitchell ignition switches, turn signal switches and rolled shapes meet the most exacting specifications of the automotive industry for quality and excellence of design. You will find these Mitchell products widely used by leading manufacturers of cars, trucks, buses and tractors.

Mitchell clamp-on end screw type semi-automatic turn signal switch for trucks, cars, buses, tractors.

Mitchell 6-wire concentric type semi-automatic turn signal switch used in passenger cars.

TURN SIGNAL SWITCHES — Mitchell semi-automatic, self-cancelling turn signal switch affords motorists an easy, positive method of indicating right or left turns — gives pedestrians and approaching and following vehicles accurate, fully visible turning information.

ROLLED SHAPES—Mitchell offers a complete range of metals, designs and gauges in stainless steel, aluminum, brass, bronze, copper; cold rolled, drawn and pressed for automobiles, airplanes, architectural requirements, railroad cars, radios, television receivers, all industrial uses.

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UNITED AIR CLEANER DIVISION • CHICAGO 28

AIR CLEANERS • METAL STAMPINGS

Powdered Iron Blades

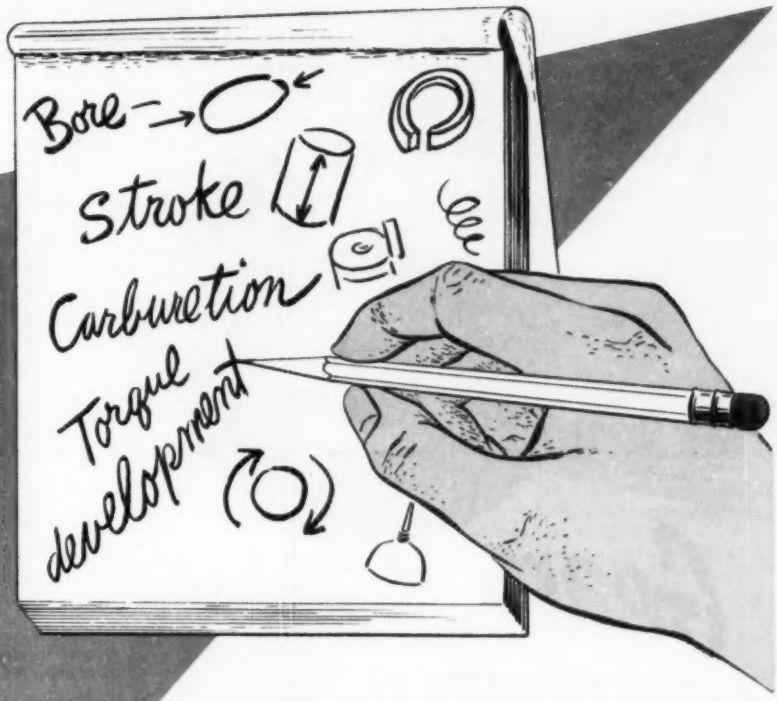
(*Continued from page 41*)

The ultimate strength of TP-1 blades is approximately 100,000 psi. The parts have been specified for use in the Allison J-35 turbojet engine for the past year and have given excellent service. More than one million stator blades have been produced. Experimental work is now underway to approve the blade for rotor installation.

From the manufacturing standpoint, major advantage of the powder metal technique is the ability to use relatively small presses and light pressures. The effect on die life is therefore salutary. For example, current molding and coining dies, made of conventional tool steels, give a life of 75,000 to 250,000 pieces. If and when greater productivity is required, it is believed that sintered carbide dies will be good for 250,000 to one million blades.

Long die life is reflected in excellent reproducibility of dimensions and form. Working tolerances are as follows: Plus or minus 0.003 in. to airfoil contour; plus or minus ½ deg of twist; and plus or minus 0.010 in. deviation from the theoretical CG line.

From the standpoint of production economy it is of interest that powder blades are made in just two basic sizes to simplify handling and die equipment. Later, when the blades have been completely finished they go to the machine shop where they are cut to the variety of lengths and suitably machined at the root in a battery of small surface broaching machines.



WHATEVER THE PISTON RING REQUIREMENTS OF YOUR ENGINES,

PEDRICK ENGINEERS CAN HELP YOU MEET THEM

Add to the knowledge of your own organization, the wealth of piston-ring experience and know-how which Pedrick engineers can bring, and see how quickly you resolve even the biggest problems in engine performance.

Look at the "Heat-Shaping" process, the double-disk grinding method, the use of centrifugally cast C90 special alloy, the original ring coating, the present "Silcoat," the production of the *best* chrome-faced rings, the promotion of narrower rings now recognized to be far more suited to varying engine conditions, and, presently, the development of a radically different and most effective ring expander. These are tangible evidence of engineering developments and contributions by Pedrick.

Get the thinking and background of an organization that has worked for more than 30 years, with singleness of purpose, on piston rings in their relation to efficient engine performance.

At the 1950 Summer Meeting of the S.A.E., Mr. Helmuth Braendel, Pedrick chief engineer, contributed our thinking to a symposium on the subject of engine wear. If you do not have a personal copy of Mr. Braendel's remarks, write now for Form 422. WILKENING MANUFACTURING CO., Philadelphia 42, Pa. *In Canada:* Wilkening Manufacturing Company (Canada) Ltd., Toronto.

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"Heat-Shaped" PISTON RINGS

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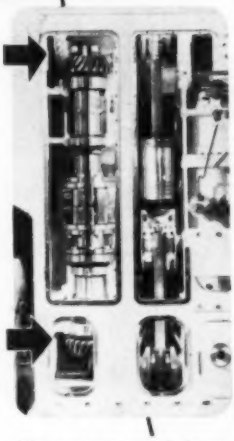
Gears by FAIRFIELD



The gear sets used in interconnecting the crankshafts of opposed piston diesel engine are indicated by arrows above.

TWO sets of spiral bevel gears produced by Fairfield interconnect the dual crankshafts of the opposed piston diesel engines in the locomotive shown above, which is one of an ever-increasing fleet serving America's railroads. Diesel locomotives are just one of the many types of equipment that have benefited from Fairfield's pioneering work in producing high precision, automotive type gears to meet virtually any required specification of industry. If gears are a part of the product you make, get acquainted with Fairfield. Write today.

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Publications Available

(*Continued from page* 56)

specifications in respect to speeds and feeds, available cycles, dimensions, shipping data and mechanical details are included.

L-116 Power Brushes

Osborn Manufacturing Co.—A new four-page booklet that describes a recently developed line of Heli-master power brushes is offered. It features many photographs illustrating the design and use of the new brush. Inserted in each booklet is an Application Data Sheet which can be filled out by a company having a cleaning, scrubbing or finishing problem which could be solved by brushes.

L-117 Grinding Machines

Landis Tool Co.—Issued to describe the latest 10 in. and 14 in. Type CH plain hydraulic cylindrical grinding machines, a new 22-page catalog uses 38 pictures and line drawings to illustrate the modern design features of these machines. There are also sections describing semiautomatic operation and angular wheel base grinding.

L-118 Solderless Connectors

Buchanan Electrical Products Corp. —Bulletin 750, four pages describes manufacturers' improved line of Underwriters' approved pres-SURE-connectors for solderless splicing and terminating of electrical wires. Contains detailed descriptive data, installation instructions and ordering information.

BOOKS...

TREATISE ON POWDER METALLURGY, Volume 2, by *Claus G. Goetzel*, published by *Interscience Publishers, Inc.*, New York 3, N. Y. Price $18.00. This second volume of the encyclopedic treatment of powder metallurgy presents 16 more chapters divided into two parts—applied powder metallurgy and physical powder metallurgy. It covers such items as refractory metals and alloys, electrical and magnetic materials and products, ferrous and nonferrous materials, porous products and friction products in the first part. Theories are given for bonding and sintering as well as the practical evaluations and theoretical analyses of the materials, products, and processes discussed in part two.

DIESEL-ELECTRIC LOCOMOTIVE, by *Charles F. Foell* and *M. E. Thompson*, published by *Diesel Publications, Inc.*, New York 16, N. Y. Planned to give a factual instructive presentation of the Diesel-electric locomotive, this book contains its history, advantages, engineering, construction, operation, general principles of maintenance, and selection to meet various conditions of expected use. Chapters are also given on engineering fundamentals concerning the Diesel-electric.

How to keep a rubber gasket in its place

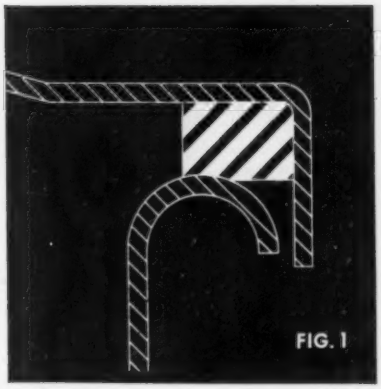
FIG. 1

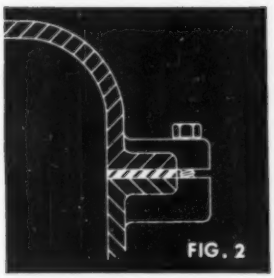
FIG. 2

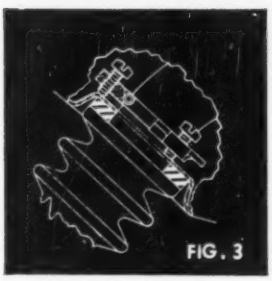
FIG. 3

For some applications, rubber makes an ideal gasket. In many cases, however, rubber's lack of compressibility introduces certain problems. Under pressure, rubber tends to creep out of place unless confined on four sides. This is especially true when lubricants are present.

The obvious way to overcome this tendency to side flow under pressure is to add to rubber the amount of true compressibility required for each application. This is done by compounding the various rubbers with calculated amounts of compressible cork particles. When such a material is compressed within its recommended range, it compresses itself, actually decreasing in volume, with virtually no tendency to creep.

Cork introduces a second factor that inhibits lateral flow, i.e., high surface friction. The surface of a typical Armstrong's Cork-and-Rubber Composition is dotted with cork particles. Since this cork retains most of its friction when wet with oil, cork-and-rubber gaskets are almost a necessity on oily flanges.

Armstrong's Cork-and-Rubber Compositions offer a wide range of characteristics. They are made with Neoprene, Thiokol, and Buna N as required, and in various hardnesses.

Except in the case of fluids that might attack their cork content, Armstrong's Cork-and-Rubber materials offer solvent resistance comparable to straight rubbers of corresponding base polymers. Nonsponged materials are impervious.

Some typical cork-and-rubber applications are illustrated on this page. Figure 1 shows how one of Armstrong's Cork-and-Rubbers conforms to a rolled tank edge with no tendency to slip off. Figure 2 shows the flange of an oil-filled switch. Cork-and-rubber seals it under high flange pressure without creep. In Figure 3, cork-and-rubber cushions a transformer bushing and keeps it oiltight.

Let Armstrong's Cork-and-Rubber Compositions help solve your sealing problems. Your Armstrong representative will help you select suitable materials for your job.

New Gasket Handbook now available

You'll find useful application and specification data in the new 20-page edition of "Armstrong's Gasket Materials." It contains up-to-date information on straight synthetic rubber, cork-and-synthetic-rubber, and cork compositions, together with sections on friction drive materials and DK-153 adhesive-backed tape.

This booklet includes technical discussions covering many important factors that influence modern joint and gasket design. These points are summarized in a convenient list for use in checking over your design.

For your personal copy of this free booklet, fill in the coupon shown at the right and mail it today.

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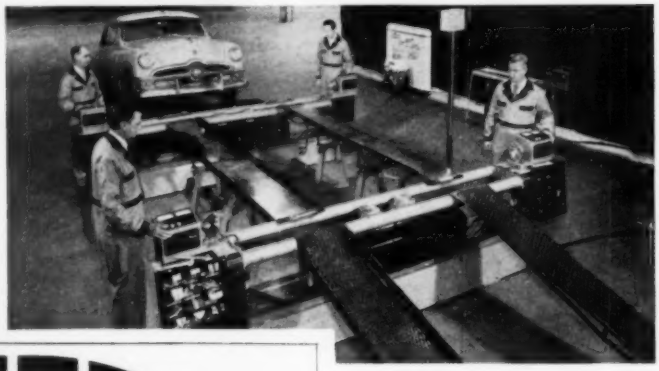
NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 56

M-57—Electronic Wheel Balancer

Equipment for electronically checking and correcting any unbalance of wheels on new cars, as a final assembly



Stewart-Warner electronic wheel balancer for final assembly line operation

line operation and at a speed consistent with the rate of the line, has been produced by Stewart-Warner Corp., Chicago, Ill.

The balancer, designed to provide a standard assembly service or operation, employs principles of the electronic wheel balancer marketed by Stewart-Warner since 1945 and used by automotive service dealers and shops.

In demonstration, cars of any tread-width or wheel base were driven onto a horizontal metal ramp and automatically positioned for balancing. With front wheels turned by electric spinners and rear wheels by the motor of the vehicle, an operator at each wheel of the car immediately and simultaneously checked for unbalance, corrected for both static and dynamic unbalance and re-checked after necessary weights had been added. New cars as well as cars or trucks which had been in use for varying periods were used in the demonstrations. In no instance, including higher mileage vehicles revealing extreme unbalance, did correction require more than 120 seconds, according to engineers. Average time required on all vehicles was approximately 90 seconds.

While offered specifically as a precision and fast wheel balancing unit to insure delivery of new cars from the factories to dealers with wheels in proper balance, the machine also can be used as an inspection device to detect maladjustment or failures in other rotative parts. Excess play, looseness, or failure of parts, such as broken wheel bearings, can be detected.

Production of the new balancing equipment will be entirely on a custom-built basis, a unit for fleet garages, army vehicle depots or other types of large volume automotive servicing facility being under consideration. This unit would balance two wheels simultaneously rather than four, but by employing the same electronic elements for detection and correction of unbalance, would provide all advantages of the production line balancer other than speed, it is said.

(*Turn to page 64, please*)

Dole DV

Thermostats by truly modern performance from new design, will help sell your cars—make buyers boosters

Accurate, powerful thermal element.

Operates positively against high pump pressure of sealed cooling systems. Efficient with atmospheric systems.

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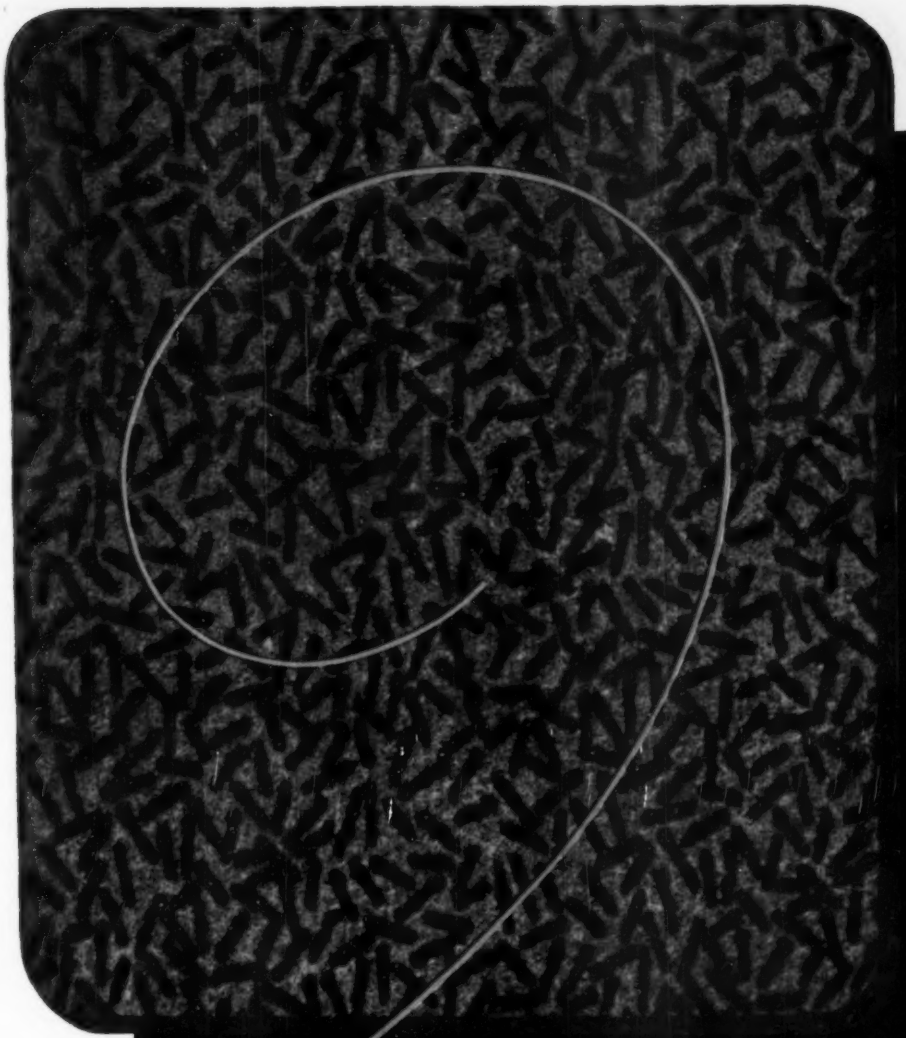

TURKEY TRACKS... millions of 'em!

They're everywhere . . . for over fifteen generations of automobiles the turkey track or crow foot pattern has been the most popular BURTEX felt for trunk lining and trim material . . . carried by nearly 250 automotive trim jobbers from coast to coast. The reason! — long wearing, overall pattern makes for economical and easy cutting.

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BURLINGTON MILLS INCORPORATED

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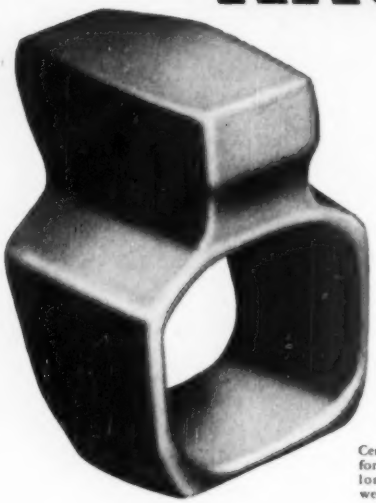
forgings by KROPP



Center guide forging for tank track. 5¾" long – 3½" wide – weight 10 pounds.

Tanks *must not* fail in action. The breakdown of one small part could spell disaster. That's why parts such as the one shown are forged. Only forgings can assure maximum toughness and resistance to shock that is so essential in all equipment . . . particularly so in material for defense.

Kropp forgings are the quality product of skilled craftsmen . . . men with many years of forging experience . . . using the most modern forging methods and equipment. No wonder, then, that Kropp, *America's Number One Forge Plant*, is called upon to help keep America strong . . . daily producing thousands of parts for tanks, guns, ships and planes.

We invite your inquiry on drop, hammer and upset "forgings to your specifications."

KROPP FORGE COMPANY
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Are you receiving "FORGINGS" . . . the KROPP publication for industry? If you want to keep current on forging facts, send us your name and address and ask for "FORGINGS".

NEW PRODUCTION AND PLANT EQUIPMENT

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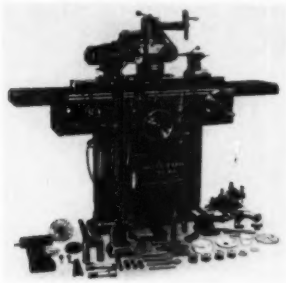
(Continued from page 62)

M-58—Cutter and Tool Grinder

Announced by Gallmeyer and Livingston Co., Grand Rapids, Mich., is a new Model 62 motor driven power feed universal cutter and tool grinder having a table 6 in. wide by 42 in. long with a single 9/16 in. tee-slot running its entire length. This machine swings work up to 12 in. diam, takes 28 in. between work head center and tailstock center and has a longitudinal table movement of 24 in.

A cabinet base machine, it provides the anti-friction ball bearing table with ball bearings carried in micarta track. The raising and lowering of the grinding wheel head and the cross feeding of the head and column are arranged



Gallmeyer and Livingston universal cutter and tool grinder, Model 62

so that the sub-table and table remain fixed as to vertical or transverse movement. This fixed table allows the operator to stand up close to his work, the weight of the attachment and the work being carried directly over the base.

The machine provides Bijur one-shot lubrication system, plus grease-sealed ball bearings on all rotating shafts, and greased-for-life, dust-tight, cartridge-type precision ball bearing spindle. Guarding against grit and dirt getting into the bearings, the vertical movement of the No. 62 has dove-tailed ways on the two sides of the raising and lowering column. The column is protected from grit and dirt by telescopic guards. If wear eventually occurs after years of service, it may be compensated for by means of a taper gib.

Power feed, optional on Grand Rapids No. 62, provides for an infinite number of longitudinal table speeds from 4 in. to 100 in. per min. A master hand

(Turn to page 67, please)

Illustrated is the new R-M plant at 1440 N. Lemon St., Anaheim, California (Los Angeles Area.)

Established in 1919 at Detroit, R-M is one of America's leading manufacturers of fine quality lacquers, enamels and undercoats for automobiles, trucks, farm equipment, appliances, and numerous other products of industry.

"How our Expansion Program will benefit you . . . ."

"We have purchased manufacturing and warehousing facilities at Anaheim, California to serve our West Coast customers, but *all* users of R-M finishes throughout the country will benefit from our increased overall capacity resulting from this expansion. Our California plant is expected to ease the strain on our Detroit operation, and obvious coast shipping problems will be automatically eliminated.

"*All* R-M users will continue to benefit from our 31 years accumulative experience in the scientific research and manufacturing of automotive and industrial finishes.

"You are cordially invited to pay us a friendly visit at Detroit or Anaheim, California."

FREDERICK G. WEED, President

Rinshed-Mason Co.

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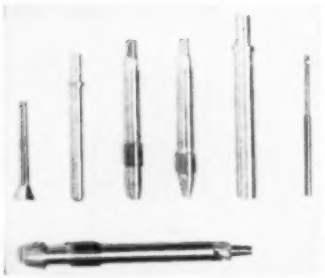
Various Methods Used to Turn Long Screw Machine Pieces



Larger pieces are valve stems which have been turned with box tools. The very thin, long piece was turned with a carbide V-block support—Courtesy Waterbury Screw Machine Products Company, Waterbury, Conn.

Turning of long diameters in screw machine work can be accomplished by any one of several methods.

The use of box tools with either rollers or V-blocks for support is quite common for the copper-base alloys. There has been a gradual swing toward tungsten carbide for these support surfaces to eliminate wear and loading. This is especially true where exceptionally high surface speeds are used.

With swing tools, either high speed steel or tungsten carbide bushings are utilized for support.

Either a spring-loaded floating male or female center has been used with success with a box tool for work in multiple-spindles.

Roughing, Finishing Setup

Two diametrically-opposed tools are finding increased use. In this case one tool is set slightly ahead of the other and the trailing tool takes off the amount of metal a finishing tool does. The leading tool acts as a roughing unit. Support is thus attained by pressure on two sides of the work.

Skiving is normally associated with accurately turned and burnished work, but this tool will cut a comparatively long, thin diameter without deflection or distortion of the piece.

Temper Can Be Increased

In most cases, the stock temper for free turning brass rod is sufficient to be generally used in sizes above $\frac{3}{8}$ in. Where smaller diameter stock is used or the turned surface is exceptionally long, it is sometimes advisable to obtain metal with a slightly higher temper.

On exceptionally long parts, tool pressure increases as the cutting tools become dull. To eliminate continual changing of the tool for sharpening, carbide cutters are generally advisable despite their higher initial cost.

Clearances on cutting tools for this type of work must be sufficient to insure against any rubbing or burnishing action as this automatically increases tool pressure on the work which tends to thrust the work away from the cutter, causing either a tapered cut or bending. Low feeds with high speeds are normally selected. However, excessive spindle speeds can produce whipping, causing rough, chattered surfaces.

Lab Advice Available

In selecting alloys for screw machine work, Bridgeport's laboratory has the background which comes with experience to help you in making a choice not only from the machining standpoint but the application of the part. Write to your nearest district office for information.

Boring-Burnishing Tool Used for Close-Tolerance Hole

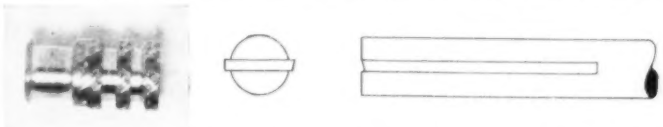
Boring of brass bearings and sleeves in screw machines can be accomplished with close tolerances and excellent finish through a carbide boring-burnishing tool.

Using free machining brass rod and this type tool, one manufacturer held a tolerance of 0.0003 and a burnished surface on the I.D. of a $\frac{7}{8}$ in. long bearing to be used as a casting insert.

Starting with a shank roughly 1/16 in. smaller than the bore, a slot was milled and a piece of carbide greater in width than the bore desired, 1/6 in. thick and $1\frac{1}{4}$ in. long, was inserted on the centerline. The carbide was radially ground to the diameter of the finished bore. Then one lip was ground with front and side clearance, leaving the opposite side with the original radius. This acted as a burnishing tool. The cutting edge has no back clearance. To insure a smooth cut, the cutting edge was broken with a diamond stone, but was not rounded off to any extent.

About 0.004 to 0.006 in. was left in the hole for finishing. A fine feed was used with top spindle speed.

For larger holes it is sometimes necessary to have a wider difference between insert and shank to permit chip clearance. The length of the insert should be greater than the length of the hole being bored and always in contact with the hole through its entire length.



(Left) Bearing insert with outside knurl to insure anchoring in casting and mirror-like bore with 0.0003 inch tolerance. (Right) Combination boring-burnishing tool used to produce bearing diameter in screw machine—Courtesy The Waterbury Screw Machine Products Company, Waterbury, Conn.

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(*Continued from page* 64)

wheel provides three longitudinal table speeds of ½ in., 3½ in. and 8¼ in. per revolution of hand wheel. The hand wheel which actuates the vertical movement may be set at any point in a complete 360 deg arc.

Portable motor driven coolant system or filtering type dust collector is optional.

M-59—Die Handling Stand

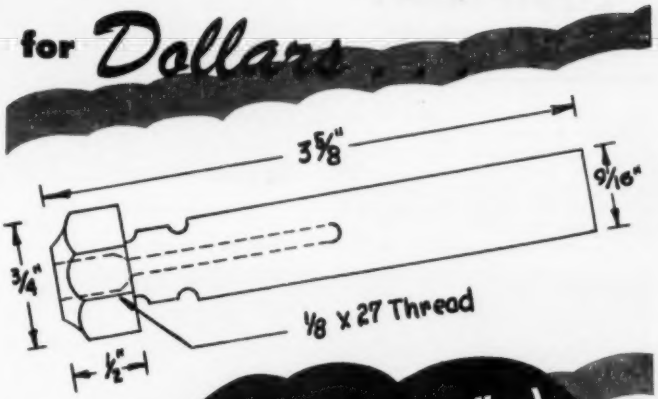
Designed for use with Pratt & Whitney Kellerflex flexible shaft machines, the DI-RO stand facilitates the handling of heavy dies, molds, patterns and castings during hand finishing operations. Of welded construction the stand is 2 ft sq, 30 in. high and has a turntable on which the heavy work can be rotated freely, allowing the operator to work from one location. The turn-table

Pratt & Whitney DI-RO stand for handling of heavy dies, molds, patterns and castings

is mounted on a heavy duty thrust bearing, fully protected from dust and chips, and is capable of handling work loads up to 3 tons. A quick-acting clamp is provided to lock the table in any position.

The DI-RO stand enables the operator to rotate heavy work easily, reducing handling time and eliminating also the chance of injury from pulling or turning heavy work about on wooden benches. A hinged arm, attached to the side of the stand, is provided to mount the Kellerflex, allowing it to swing in an arc of 180 deg. This gives the operator freedom of movement with the handpiece and keeps the flexible shaft clear of the work. A storage compartment inside the stand, with access through a

How to trade *Pennies* for *Dollars*



10c more (per gallon) invested in cutting fluids SAVES $50 PER DAY PER MACHINE!

PRICE alone makes no profit. The drawing above illustrates a shackle bolt which is drilled and tapped on a New Britain Automatic. Using an inferior cutting oil 12 taps were used up every 2½ days—12 pieces per tap. A change to Stuart's SPEEDKUT M on a 2½ day run showed 530 pieces per tap—no taps used up. The saving? Taking into full account the pennies-higher price of Stuart *quality* oil: $50 per day per machine!

If you are interested in a saving like this, ask to have a Stuart representative call. There is no obligation—we'll let Stuart performance do the selling.

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Send for your copy of **"CUTTING FLUID FACTS,"** *Stuart's booklet of cutting fluid data.*

D.A. Stuart Oil Co.

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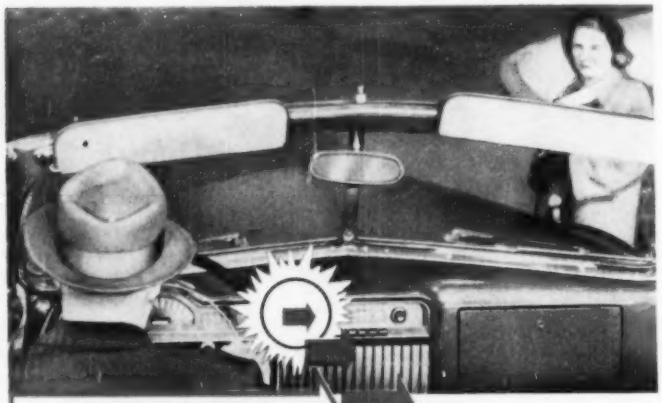
steel door at the front, provides safe keeping for Kellerflex accessories and the operator's personal tools. Although the DI-RO stand was designed for use with Kellerflex it can be adapted to any other flexible shaft machine or portable grinder.

Cincinnati Filmatic 16 in. by 96 in. roll grinding machine, equipped with hydraulic profile wheel truing unit.



THE SIGNAL PILOT LIGHT
means greater safety on the highway

Illuminated direction signals for motor vehicles are fast approaching the "standard equipment" classification of safety glass and sealed beam headlights. As the use of lights for this and other signaling purposes becomes universal, TUNG-SOL Flashers assume greater importance as part of any automotive system.

TUNG-SOL Flashers start instantly and provide the commanding blinking action for the signal—plus the important safety pilot light on the instrument panel. This pilot light when properly installed provides positive indication for the driver that the system is working properly.

Though it normally lasts for the life of the vehicle, the TUNG-SOL Flasher requires no maintenance and consumes little current. Since 1939, nearly 10,000,000 have been bought. The TUNG-SOL Flasher is now standard or optional equipment on virtually every American made automobile. *Write for more information about TUNG-SOL Flashers.* TUNG-SOL LAMP WORKS INC., Newark 4, N. J. *Sales Offices:* Atlanta, Chicago, Dallas, Denver, Detroit, Los Angeles, Newark, Philadelphia.

TUNG-SOL SIGNAL FLASHERS

ALSO AUTO LAMPS, ALL-GLASS SEALED BEAM LAMPS AND ELECTRON TUBES

M-60—Plain and Roll Grinders

Three additional sizes have been added by Cincinnati Grinders Inc. of Cincinnati, Ohio, to their line of large plain grinding machines and traveling table roll grinding machines. The new sizes are 16 in. heavy duty and 20 in. and 24 in. plain grinders; and 16 in., 20 in. and 24 in. roll grinders. These sizes round out the Cincinnati line to include both standard weight and heavy duty machines in all sizes from 10 in. to 24 in. swing.

Grinding wheel spindle bearings are the Filmatic type, consisting of segments which are free to rock slightly in the housing bore, thereby admitting wedge shaped oil films between them and the spindle journal diameter as rotation occurs. The wedge shaped films build up to high pressures, supporting the spindle on oil and eliminating metal-to-metal contact. In addition, Filmatic bearings are self-adjusting for variations in forces created by the grinding action.

A dc motor, controlled electronically from an ac source, drives the table through a rack and pinion. This type of drive provides dial selection of an infinite number of traverse rates from 3 in. to 120 in. per min. To eliminate shock, the table automatically accelerates and decelerates at table reversal. No mechanical clutches are employed. Table tarry may be adjusted independently at each end of the stroke. Coolant flow and headstock spindle rotation automatically start and stop with the table traverse, or independently, as desired. All important bearings are automatically lubricated. An individual circulating system supplies filtered oil to the grinding wheel spindle bearings. A second circulating system automatically lubricates the table and cross ways with EP oil.

The headstock is a dead spindle, dc motor driven unit, having a speed range of 20 to 72 rpm for the 16 in. size, and 15 to 54 rpm for the 20 in. and 24 in. sizes. Taper hole in both headstock and footstock spindles is No. 15 B. & S.

Extra equipment available includes automatic wheel balancing and hy-

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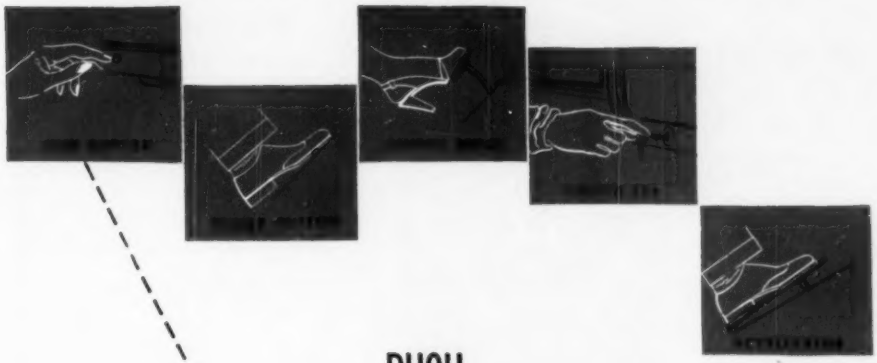

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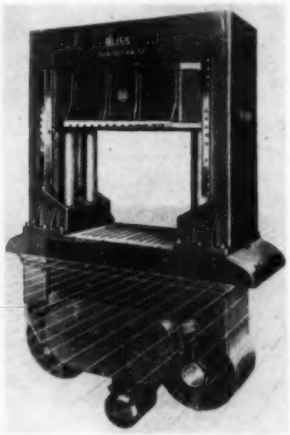
draulic profile wheel truing equipment. The roll grinding style includes power cross feed to the wheelhead, and tilting wheelhead type roll cambering mechanism. Adjustment for amount of camber is obtained through a double eccentric and change gear arrangement.

Plain machines are built in seven lengths at two foot intervals, from 48 in. to 192 in., while the roll grinder style is built in the same lengths up to 168 in. Principal power requirements are 20 hp for the wheelhead motor; 2 or 3 hp for the headstock motor; 1½ hp for the table drive motor.

M-61—Underdriven Eccentric Presses

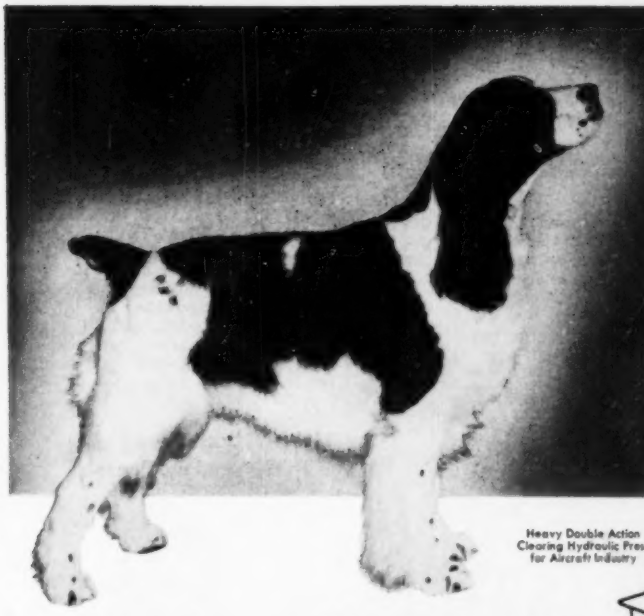
A new line of four-point underdriven eccentric presses brought out by E. W. Bliss Co., Toledo, Ohio, and developed in cooperation with leading automoble builders, provides easy accessibility of



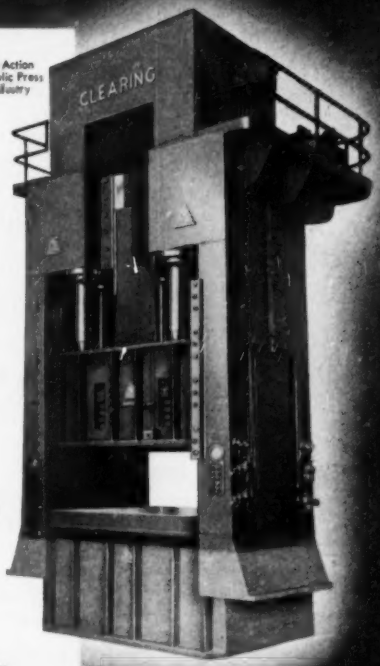
Bliss four-point underdriven eccentric press, type SU-4

all parts, minimum service requirements and heavy construction, suited to severe round-the-clock service in automotive stamping plants. Designated SU-4 after the Joint Industry Conference system for single action, underdriven, four-point presses, the line offers sixty-three standard sizes, of capacities ranging from 300 tons to 3,000 tons and bed areas from 72 in. by 48 in. to 300 in. by 108 in. (R to L by F to B). Heavier capacities can be built to order.

(*Turn to page 72, please*)



Frejax Royal Salute, owned and bred by Fred Jackson, Detroit, Michigan



Heavy Double Action Clearing Hydraulic Press for Aircraft Industry

Just another dog?

To the casual observer he may look like just a neighbor's pet, but this is Frejax Royal Salute, holder of "Best in Show" in over forty dog shows. This outstanding achievement is the result of years of selective breeding.

Production men know that, while presses may look alike to the uninitiated, "breeding" pays here too. The years of practical Clearing experience combined with advanced engineering concepts make every Clearing press a thoroughbred. Clearing designs are never shackled to tradition, a fact which accounts for the performance records established by Clearing press in such a wide variety of operations.

Before you invest in more equipment, have a Clearing representative explain how Clearing presses can save dollars and cents in your plant. Wire today to bring Clearing's fine engineering staff to bear on your problem, without obligation.

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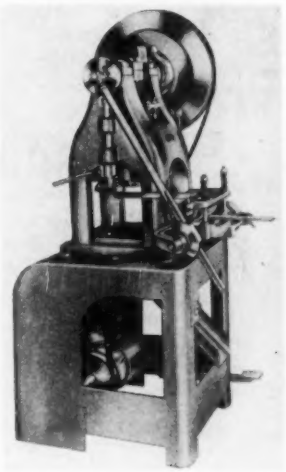
(Continued from page 70)

All bearings are arranged to permit shafts to be dropped straight down, without pulling. Presses are double geared, with the driving eccentrics cast integral with the main drive gears. All gears can be arranged to run in oil.

The fast acting Bliss single disk pneumatic friction clutch is standard equipment. This clutch does not require adjustment for wear and friction plates are arranged for rapid heat dissipation. When worn out, the plates may be removed and replaced quickly without disassembling the clutch.

Connections are unusually long, resulting in small minimum side thrust. Sideposts are fully skirted at the connection joint and are arranged with internal pre-shrunk steel tie-rods which absorb the work load. The motor driven slide adjustment mechanism meshes with external threads on the top of the side posts, allowing extremely long adjustment by lengthening the threaded portion of the posts. Since the work load is carried entirely by these side posts, there is no need for tie-rods in the frame of the press.

M-62—High Speed Automatic Press



For a more complete coverage in the high-speed automatic press field, Di Machine Corp., Chicago, Ill., has added an 8-ton model to their line. They also make a 5-ton and a 12-ton press. A cylinder type ram slides in an adustable bronze sleeve for accuracy and long life; a variable speed drive selects any speed from 110 to 350 strokes per min.; and a built-in roll feed, either single or double construction, is said to afford easy setting and high accuracy.

M-63—Hex Head Drilling Machine

A new type of machine for speeding up the drilling of wire holes in hex heads, brought out by the Govro-Nelson Co., Detroit, Mich., employs three Model HH Govro-Nelson automatic drilling units which drill three holes at once. The part is then turned and the three units are operated a second time to complete the six holes. Drilling six No. 50 wire holes in a cap screw with

(Turn to page 74, please)

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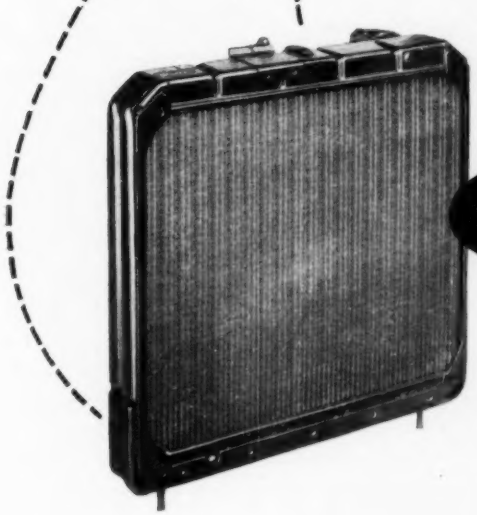
newest model *White* trucks *use* LONG RADIATORS

Like the *White* "3000" series, the new, lighter "3014" features the power-lift cab, which makes front end mechanical units easily accessible for maintenance.



LONG

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Since 1903, *Long* radiators have supplied leading car, truck, bus and tractor manufacturers with *balanced systems* for engine cooling requirements.

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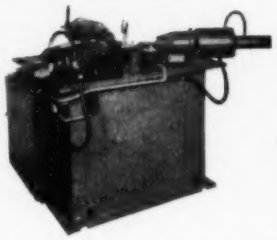


Govro-Nelson machine for drilling wire holes in hex heads

hardness of 25 Rockwell C, the first machine built by the company showed a production rate of 288 pieces per hr, involving the drilling of 1728 holes. With minor changes, the machine can be adapted to the drilling of multiple holes in other parts of similar size and character.

M-64—Eccentric-Cam Press

Suitable for the forming of smaller parts such as bearings at high production rates, the new model F-4 eccentric-cam press manufactured by F. J. Stokes Machine Co., Phila., Pa., applies four tons pressure from above and below simultaneously. Speed is variable from 34-50 strokes per minute by turn of a handwheel. Cams, shafts, and motor completely enclosed in a welded steel frame keep dust and dirt from moving parts. Greasing is simplified through centralized lubrication system. Press provides stationary core rod, adjustable gibs, clamp ring die holder, hardened die table top, and guided lower plunger and counter.

EVERY CAR OWNER KNOWS

"You're always right with AUTO-LITE"

TODAY more than 400 Auto-Lite products are standard equipment on many of America's finest cars, trucks and tractors . . . convincing proof of unfailing dependability. That quality is reflected in the public acceptance of the name Auto-Lite—the best advertised name in the automotive after-market. It is reflected, too, in the establishment of Auto-Lite service facilities throughout the world. Today's buyers of cars, trucks and tractors know "You're Always Right...With Auto-Lite."

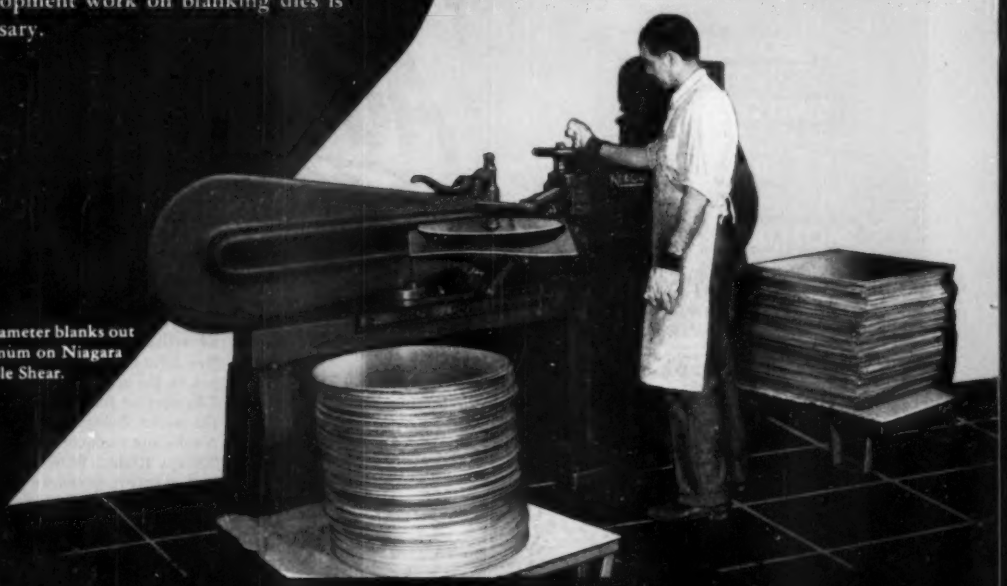
THE ELECTRIC AUTO-LITE COMPANY
Toledo 1 Ohio

Select NIAGARA

NIAGARA RING AND CIRCLE SHEAR

- ★ Circular blanks of various diameters and thicknesses are quickly and accurately cut.
- ★ Initial cost and maintenance of blanking dies is eliminated.
- ★ Wide range of sizes can be produced in the circle shear with less set-up time than is required for setting-up a blanking die.
- ★ Sturdy construction insures minimum maintenance costs.
- ★ The size of the blank can be easily changed to accomplish the results required in the drawing operation. No development work on blanking dies is necessary.

For instance, in the Buffalo Plant of American Machine & Foundry Company a NIAGARA Ring and Circle Shear is teamed up in economical production with a NIAGARA Double Crank Press making aluminum restaurant equipment.



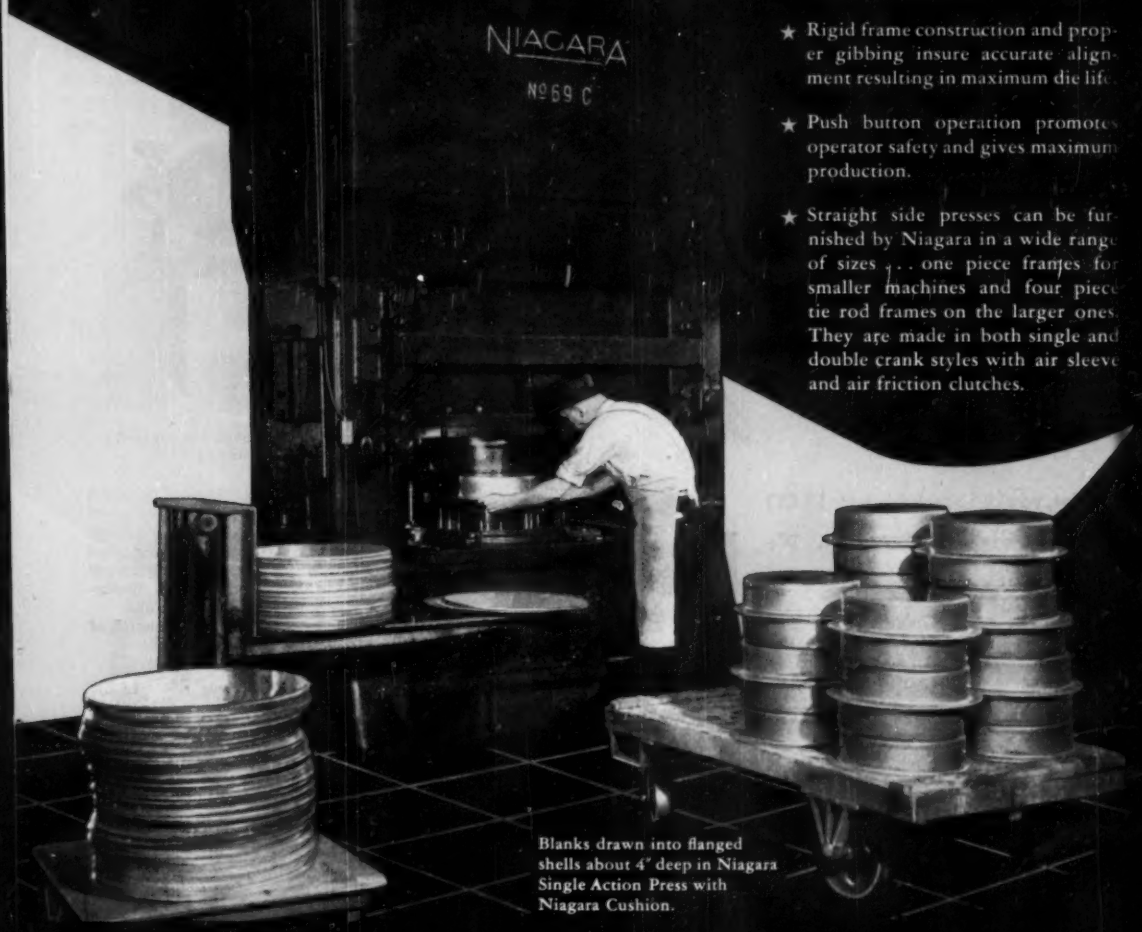
Cutting 22" diameter blanks out of 1/8" aluminum on Niagara Ring and Circle Shear.

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

Machines which suit YOUR Production Requirements

NIAGARA DOUBLE CRANK PRESS

- ★ The use of Niagara pneumatic cushion permits drawing operations in a single action press.
- ★ Less set-up time is required than in a double action press where two slides must be adjusted for each thickness.
- ★ Simple drawing dies are used. The initial cost and maintenance are held to a minimum.
- ★ Rigid frame construction and proper gibbing insure accurate alignment resulting in maximum die life.
- ★ Push button operation promotes operator safety and gives maximum production.
- ★ Straight side presses can be furnished by Niagara in a wide range of sizes . . . one piece frames for smaller machines and four piece tie rod frames on the larger ones. They are made in both single and double crank styles with air sleeve and air friction clutches.



Blanks drawn into flanged shells about 4" deep in Niagara Single Action Press with Niagara Cushion.

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK

America's Most Complete Line Presses, Shears, Machines and Tools for Sheet Metal Work

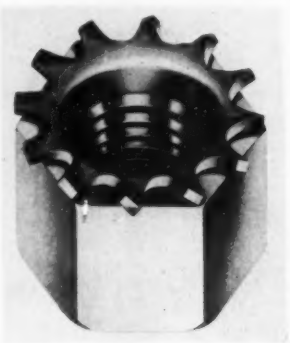
NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

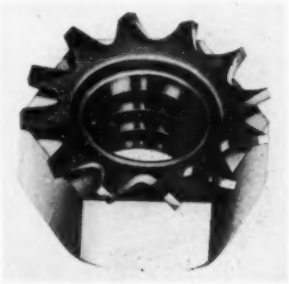
P-95—Pre-Assembled Nuts and Washers

Shakeproof Inc., Division of Illinois Tool Works, Chicago, Ill., comes forward with a new fastening invention, KEPS, designed to make assembly operations easier and assure tighter, stronger connections wherever threaded nuts are employed. KEPS, a companion product to SEMS—pre-assembled screws and Shakeproof lock washers—are pre-assembled nuts and Shakeproof lock washers, designed to extend all the advantages of pre-assembly to nut applications. Because nut and washer are inseparably pre - attached, they are designed to save millions of hours of production time through elimination of costly hand operations as well as to assure easier starting and driving, simplified ordering and stocking, and tighter fastenings due to an engineered three-way locking action of a Shakeproof lock washer under every nut.

In mass assembly, the construction of



Shakeproof KEPS for applications requiring American Standard light nuts.



Shakeproof KEPS for applications requiring American Standard machine screw nuts and American Standard regular nuts.

YOU'RE IN LUCK WITH ELCO Screws

STANDARDS

WOOD SCREWS • MACHINE SCREWS • TAPPING SCREWS • STOVE BOLTS • NUTS • CAP SCREWS • LAG SCREWS • PIPE PLUGS • PHILLIPS HEAD SCREWS • SEMS SCREWS • SELF TAPPING SCREWS

Yes, you're in luck because ELCO Screws are GOOD screws. We take extra pains at every step, from the selection of material to final inspection, to see that ELCO products are second to none in quality and uniformity. And we think *we* are in luck, too — to have such a large group of satisfied customers.

SPECIALS

SHOWN HERE: JUST A FEW OF THE HUNDREDS OF "SPECIAL" PIECES WE ARE MAKING.

ELCO TOOL & SCREW CORP., 1914 Broadway, Rockford, Ill.

SUNOCO WAY LUBRICANT
Chosen Over All Others For
WORLD'S LARGEST MILLING MACHINE

The milling machine shown below—the largest in the world, according to its builder—will soon be producing main spars for turbojet planes. The length of the ways and the weight of the table of this mammoth precision-built machine tool make its lubrication a real problem. To hold tolerances and avoid enormous refinishing expenses, the oil must support the table evenly and lubricate the ways perfectly.

To meet such requirements, the way lubricant must combine many qualities. It must be an oil with extreme pressure characteristics, metalwetting capacity, and adhesiveness, so as not to squeeze out under heavy loads; it must flow freely, prevent "stick-slip action" of the table, and successfully resist rusting.

An oil that can meet all those requirements is exceptional. So it is significant that after extensive comparative tests the machine tool builder selected Sunoco Way Lubricant and recommends its exclusive use on the ways of this costly miller. He knows this "Job Proved" Sun product protects his reputation as well as the big investment in time, money, designing skills, craftsmanship.

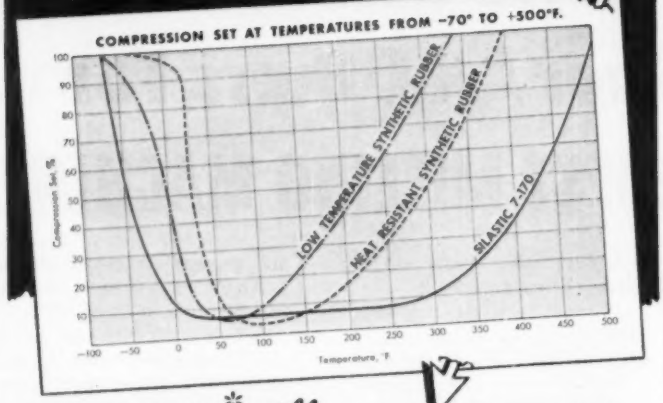
SUN OIL COMPANY • ***Philadelphia 3, Pa.***
In Canada: Sun Oil Company, Ltd., Toronto and Montreal

Overall length: 105 ft. Bed length: 90 ft.
Weight: Approximately 120,000 lbs.
Maximum travel length of carriage: 80 ft.
200 H.P. in carriage through 4 cutter head motors.
Automatic horizontal swarfing to 10° off horizontal.
Automatic vertical swarfing to 15° off vertical.
Thymotrol variable feed. Automatic chip disposal.
Manufacturer:
Onsrud Machine Works, Inc., Chicago, Ill.

SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO®

Where ordinary rubber gaskets fail . . .



SILASTIC* still stays Elastic!

AT EXTREME TEMPERATURES, Silastic has greater resistance to compression set—or to permanent deformation due to heat and pressure—than any other rubberlike material. Its elastic memory exceeds that of both the best low temperature and the best high temperature organic rubbers available. Silastic 7-170 forms a more resilient seal at −50°F. than a special low temperature organic rubber does at −7°F. At 450°F., Silastic has more resistance to permanent compression set than the most heat-stable organic rubbers have at 330°F.

PHOTO COURTESY CONSOLIDATED VULTEE AIRCRAFT CORP.

In aircraft cabin heating and pressurizing systems, Silastic gaskets stay elastic under operating temperatures ranging from −70° to 400°F. Similarly, Silastic gaskets and O-rings withstand hot oils at about 450°F. in automotive, aircraft, diesel-electric engines.

Combine that kind of elastic memory with excellent resistance to aging, to oxidation and to attack by a variety of chemicals and hot oils, and you have Silastic—the most stable of all resilient gasketing materials. That's why design engineers and maintenance men specify Silastic, the Dow Corning Silicone rubber that pays for itself many times over in reduced maintenance costs and improved performance.

SEND TODAY!

For your copy of Silastic Facts No. 10 containing new data on the properties, performances and applications for all Silastic stocks.

*T. M. REG. U. S. PAT. OFF.

from +500°F. SILASTIC stays Elastic to −100°F.

DOW CORNING CORPORATION, DEPT. C-23, MIDLAND, MICH.
Please send me Silastic Facts No. 10
Name
Company
Address
City Zone State

Dow Corning
FIRST IN SILICONES

Atlanta • Chicago • Cleveland • Dallas • Los Angeles • New York • Washington, D. C.
In Canada: Fiberglas Canada Ltd., Toronto • In England: Albright and Wilson Ltd., London

NEW PRODUCTS

For additional information please use coupon on page 56

KEPS presents only one unit to handle—eliminating separate lock washer operations. There are no lost washers, since the washer, though free to rotate, cannot drop off. Therefore nut and lock washer inventories always balance. KEPS are free spinning to assure faster, easier assembly, and special design of the lock washer "funnels" the nut onto the bolt for easier starting. Use of KEPS further assures the right lock washer every time—factory matched, the company points out.

P-96—Cork Gaskets Electronically Baked

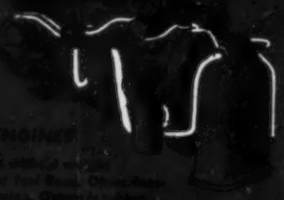
Cork gaskets that are improved by electronic baking so that they are stronger, livelier, and better sealing than any available heretofore are announced by the Victor Mfg. & Gasket Co., Chicago, Ill. The baking process, developed by Armstrong Cork Co., is claimed as the greatest advance in cork gasket making since the advent of cork composition.

Curing of the cork composition used in gaskets, it is pointed out, is a critical operation, requiring thoroughly-penetrating even heat. The problem with the conventional method of curing with steam often resulted in over-curing of the cork on the outside, or under-curing on the inside. Effect of over-curing created deterioriation of the natural springiness of raw cork. Under-curing resulted in incomplete setting of the composition—hence a weakened structure in the finished gasket. In addition, steam curing was slow, a matter of hours, because it depended on forcing heat through the thick cork mats, the form into which raw cork mix is converted in curing and from which the gaskets are made.

In contrast, says the company, the new Armstrong-Victor electronically baked cork gasket process requires less than 5 minutes. Almost instantly it sets the raw cork, binder, and other ingredients and gives the composition a strong body of maximum uniformity. Instead of forcing heat through the mix from the outside, as with conventional baking, the high frequency electronic waves generate heat from within the mix itself. Electrical agitation of the cork molecules produces a frictional heat which penetrates the mix thoroughly and evenly. This results in complete curing without diminishing the natural characteristics of raw cork.

(*Turn to page 82, please*)

THE BIG TREND IS TO OSTUCO TUBING



For more strength, less weight, smooth modern beauty, and lower cost, product designers and manufacturers are turning more and more to steel tubing—and the big trend is to OSTUCO Tubing.

Ostuco's "Single Source Service" is the reason. By performing all three basic tubing operations—manufacturing, shaping, and fabricating—at one plant, Ostuco boosts quality and eliminates expensive, time-consuming shipments from one supplier or one location to another. Unified control of production assures precision in meeting your most exacting requirements; responsibility is clearly fixed.

Ostuco produces both seamless and electric welded steel tubing in a broad range of sizes and shapes . . . performs ALL types of forging and fabricating operations . . . supplies finished or semi-finished products. Write direct or to our nearest sales office for informative free booklet "Fabricating and Forging Steel Tubing."

From Your Blueprint . . . to Your Product

OSTUCO TUBING

Tapering • Swaging • Flanging • Bending
Upsetting • Expanding • Reducing • Beading
End closing • Spinning • Drilling • Slotting
Notching • Flattening • Shaping • Trimming
Threading • Angle Cutting • And Many Others

THE OHIO SEAMLESS TUBE COMPANY

Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing
Plant and General Offices: SHELBY 12, OHIO

SALES OFFICES: BIRMINGHAM, P. O. Box 2021 • CHICAGO, Civic Opera Bldg., 20 N. Wacker Dr. • CLEVELAND, 1328 Citizens Bldg. DAYTON, 511 Salem Ave. • DETROIT, 520 W. Eight Mile Road, Ferndale • HOUSTON, 6833 Avenue W, Central Park • LOS ANGELES, Suite 300-170 So. Beverly Drive, Beverly Hills • MOLINE, 617 15th St. • NEW YORK, 70 East 45th St. • PHILADELPHIA, 1613 Packard Bldg., 15th & Chestnut • PITTSBURGH, 1206 Pinewood Drive ST. LOUIS, 1230 North Main St. • SEATTLE, 3104 Smith Tower SYRACUSE, 501 Roberts Ave. • TULSA, 733 Kennedy Bldg. • WICHITA, 622 E. Third St. • **CANADIAN REPRESENTATIVE:** RAILWAY & POWER CORP., LTD., New Glasgow, Montreal, Noranda, North Bay, Toronto, Hamilton, Windsor, Winnipeg, Edmonton, Vancouver.

NEW PRODUCTS

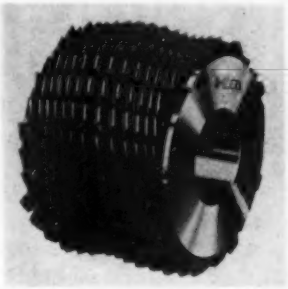
For additional information please use coupon on page 56

(*Continued from page* 80)

P-97—Elliptical Gear Hob

Barber-Colman Co., Rockford, Ill., announces a means of efficiently producing elliptical gears—a new development in the gear-cutting field. The gears are cut with a special form hob on a standard machine with a standard set-up. Although the value of elliptical gears has been realized for many years, there has been no means to produce them efficiently or accurately until the special form hob was developed, it is declared.

The hob has a number of leads equal to one-half the number of teeth in the gear, each lead cutting two diametrically opposite teeth. Since the teeth are designed from a base ellipse rather than a base circle, even the involute curves on opposite sides of the same tooth are not similar. Thus, each thread on the hob differs from each other thread. The hob is topping so that the gears can be cut from bar stock, eliminating the necessity of locating the hob with respect to the work. These true involute teeth designed from a base ellipse are said to produce the best possible rolling action.



Barber-Colman elliptical gear hob.

With elliptical gears a constantly varying output is obtained from a constant input. Both speed and power vary depending upon the eccentricity of the gears. Gears can also be designed which produce a desired quick-return ratio.

P-98—Silicone Rubber Compound

A new silicone rubber compound, designated 81223, developed by the Chemical Dept. of the General Electric Co., Pittsfield, Mass., now permits rubber fabricators to mold silicone rubber parts easier and with highly improved mechanical and thermal properties.

Many parts can be fabricated from it without prolonged oven cure and it is stated to have excellent molding and extrusion properties after only a five-minute warm-up. Because of the outstanding hot tear strength of G-E 81223 silicone rubber, parts with undercuts can easily be removed from molds; and being neutral in color, stock can be colored for product identification purposes for individual fabricators.

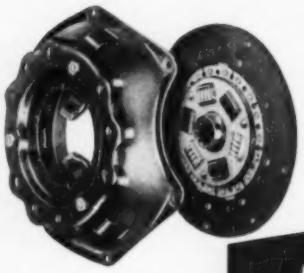
Fabricated parts obtained with General Electric's new silicone rubber compound are said to have high tensile strength, high elongation, excellent electrical properties, and to be serviceable over a wide temperature range—550 F to —85 F.

(*Turn to page* 85, *please*)

You can depend on—

BORG & BECK®

CLUTCHES... for that vital spot where power takes hold of the load!



Engineered by BORG & BECK means...

CLUTCHES EXPERTLY DESIGNED AND PRECISION BUILT BY CLUTCH-MAKING SPECIALISTS!

BORG & BECK CLUTCH — THE STANDARD

Reg. U.S. Pat. Off.

B-W ENGINEERING PRODUCTION

BORG & BECK DIVISION
BORG-WARNER CORPORATION
CHICAGO 38, ILLINOIS

easy to make

because the Stainless is Superior!

easy to sell

because the luster is permanent!

SUPERIOR Stainless Strip Steel is the choice of fabricators meeting quality-moulding demands, *because*... Superior handles just right! The long, production-speeding coils are uniformly dependable in composition. Gauge, width, temper, finish always are as specified.

Your customers benefit by the ever-bright, wearproof beauty of Stainless—*you* benefit when you standardize on SUPERIOR. Let us serve you!

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

Come to sleeve bearing Headquarters

for uniform quality and service

JOHNSON BRONZE understands the requirements of the automotive industry and, consequently, through the years has been a major source of supply for sleeve bearings. Large facilities are devoted exclusively to production for this one industry. Therefore, you can depend on Johnson Bronze quality . . . expert designing, high quality materials, careful workmanship, multiple-testing for uniformity and precision . . . and prompt service.

Johnson Bronze

SLEEVE BEARING HEADQUARTERS

625 SOUTH MILL STREET • NEW CASTLE, PA.

This modern, up-to-date plant of the Johnson Bronze Company, occupying over 400,000 square feet of manufacturing space, is devoted exclusively to the manufacturing of Sleeve Type Bearings.

You will find Johnson Engineers willing to help you decide which type bearing is best suited and to design it for the application. As we manufacture all types of sleeve bearings, we base all of our recommendations on facts, free from prejudice.

NEW PRODUCTS

For additional information please use coupon on page 56

(*Continued from page* 82)

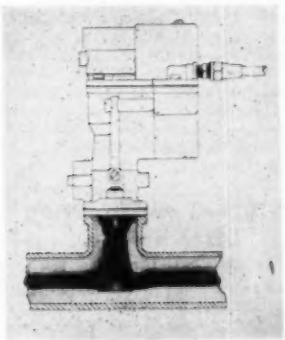
P-99—Intake Manifold Carburetion Device

A Turbo-Jet Gas Saver—an auxiliary venturi which supplements carburetion within the intake manifold of the internal combustion engine—has no moving parts, requires no adjustments, employs no air, water or "mystery fluids or trick capsules," and once installed, becomes a permanent part of the carburetor. The device, designed by members of the Society of Automotive Engineers, prominent in automotive and aircraft engine design and testing, has been placed on the market by Leake Mfg. Corp., Brooklyn, N. Y. The device picks up the droplets of liquid fuel ordinarily deposited in the manifold and converts them to combustible vapor.

This Turbo-Jet Gas Saver is claimed to increase gasoline mileage by from 5 to 22 per cent, with higher economies possible in city driving with frequent stops; to afford response to throttle more quickly than ordinary carburetion; and to obviate purchase of premium gasoline, because it extracts the fullest power from the heat units of lower octane fuel, merely decreasing detonation so that antiknock additives are not needed. Its reduction of carbon formation is declared to greatly reduce wear to pistons, rings, cylinder walls, valves and bearings.

The device may be attached to the engine of any automobile, truck or bus by one mechanic in one hour.

(*Turn to page* 86, *please*)



Leake Turbo-Jet gas saver, auxiliary venturi which supplements carburetion within the intake manifold. It directs gasoline droplets into the airstream and breaks them into fine particles to produce a volatile combustible vapor mixture.

RUBATEX

seals the windows of the Stratocruiser

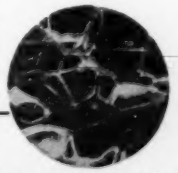
◀ AIRTIGHT UNDER PRESSURE DIFFERENTIAL
◀ DOESN'T SCORE OR CRAZE PLASTICS
◀ UNAFFECTED BY TEMPERATURE CHANGE
◀ ZERO MOISTURE ABSORPTION—WEATHERPROOF
◀ RESISTS OXIDATION

The windows of Boeing Stratocruisers are sealed with RUBATEX Gaskets to prevent escape of air from pressurized cabins at high altitudes. The dense, sealed cell structure of RUBATEX has excellent compressive strength, high resiliency and forms a leakproof joint without crazing or scoring the plastic windows. It compensates for irregularities in adjoining surfaces and has high insulating properties.

RUBATEX Closed-Cell Rubber cannot absorb moisture even at cut edges. It is rot and vermin proof. Most gasket requirements can be cut from sheet stock, thus avoiding the expense of a molded skin.

Consider RUBATEX for your gasketing, cushioning, shock-absorbing or vibration damping applications. It is available in natural and synthetic stocks in soft, medium and firm forms. Our engineers can give you valuable assistance from their experiences with countless other uses. For further information write for Catalog RBS-12-49. Great American Industries, Inc., RUBATEX DIVISION, BEDFORD, VIRGINIA.

Photo-micrograph shows how each cell is completely sealed by a wall of rubber. The material cannot absorb moisture. It has high insulating values, is highly resistant to oxidation and is rot and vermin proof.



RUBATEX® CLOSED CELL RUBBER

NEW PRODUCTS

For additional information please use coupon on page 56

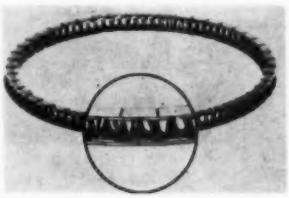
(*Continued from page 85*)

P-100—Oil Control Piston Ring

A new oil control piston ring with a low rate of tension loss, a new all-metal oil seal ring with wide temperature range, and a new high strength alloy iron for piston rings are three recent developments by Muskegon Piston Ring Co., Muskegon, Mich.

The new "Flexline" oil control rings are one-piece steel rings of the circumferentially compressible type, designed for automotive passenger car and truck engines. They provide complete side sealing of the openings between the segments forming the ring lands, with high resistance to carbon plugging. Tension loss resulting from wear is said to occur very slowly. These "Flexline" rings conform to all cylinder contours.

"Multiseal" oil rings, for use in automatic transmissions, are a new application of an old principle for sealing pressures. Full use is made of multiple sealing members acting independently on their periphery and utilizing the labyrinth action, with positive gap sealing to prevent leakage under pressure of oils and other fluids. All-metal in construction, "Multiseal" rings eliminate the temperature limitations of non-metallic packings, and function at temperatures as low as —70 F and as high as 450 F. They are available in diameters from 2 in. to 24 in.

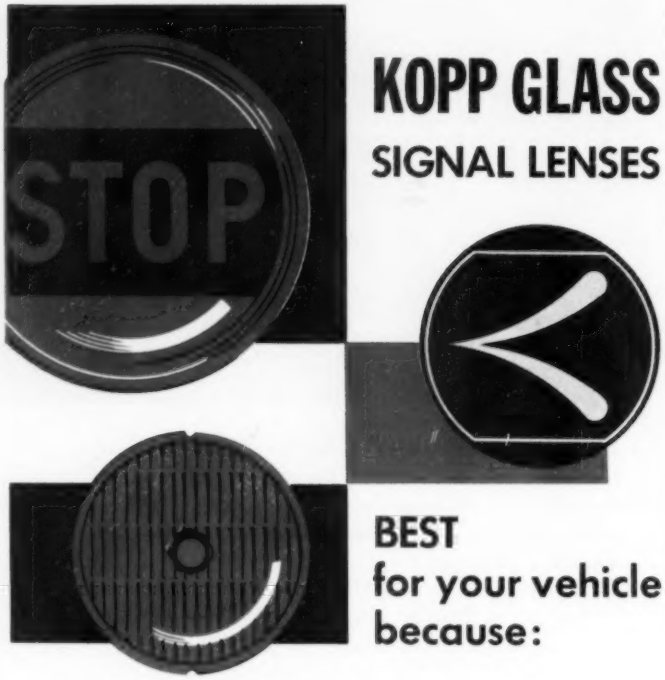


Muskegon "Flexline" oil control piston ring. Enlarged view shows complete side sealing of openings between segments forming the ring lands.

"Spartalloy ECH-101," originally developed for aircraft piston rings, is a new type high strength alloy iron now available for other piston ring applications where its high strength and thermal stability enable it to withstand unusually severe operating abuse. "ECH-101" is of the controlled structure type, electrically melted, centrifugally cast, and heat treated to provide top physical properties. Its tensile strength is 88,000 lb. sq. in. min. Its metallographic structure is characterized by a matrix of spheroidized, tempered martensite, graphite being present in temper carbon form.

P-101—Gear Deburring Lathe Setup

A new method for deburring gears and similar shaped parts, developed by the Osborn Mfg. Co., Cleveland, Ohio, is said to produce ten times the work previously turned out by hand. Using a semi-automatic universal work piece holder and brushing lathe set-up, in tests. A new operator finished 200 years per hr., whereas with the hand method, utilizing a hard tool, a trained



KOPP GLASS
SIGNAL LENSES

BEST
for your vehicle
because:

Kopp Glass Lenses are properly engineered, correctly made and carefully inspected. They are accurate and uniform in color, size and design; non-fading and durable. High-transmission properties mean effective signal transmission.

Kopp Glass Signal Lenses, Warning Lenses and Directional Arrows on your vehicles are evidence of high quality and careful consideration of all important details. Available through leading makers of vehicle signal equipment.

KOPP GLASS, INC.
SWISSVALE, PA.

KOPP GLASS

this BESLY grinder...

stepped-up grinding capacity from 200 to 800 parts per hour!

BESLY No. 218-23" Double Spindle Wet Grinder used at American Wheelabrator and Equipment Corp., Mishawaka, Indiana.

RESULTS

. . . 400% increase in grinding capacity

Both ends of Wheelabrator (centrifugal abrasive blasting machine) wheel blades are ground in one operation in this BESLY No. 218-23" Double Spindle Wet Grinder. Top capacity is 800 blades per hour. Previously blades were ground individually at a maximum rate of approximately 200 blades per hour. In addition, the new machine is more accurate and less tedious to operate.

RESULTS like these show why it pays to choose BESLY

For scores of companies BESLY Grinders—and BESLY engineering experience—have produced these results: better, more accurately finished parts . . . increased output . . . lower costs . . . or all three. Typical are the case studies shown at right. *In all probability, Besly can achieve similar benefits for you.* Find out! Call in the Besly engineer. He'll give you the facts. —He'll tell you whether BESLY can cut your grinding costs—or whether a change-over from another process to BESLY Grinding can work *substantial* savings in your production costs.

Such a survey costs *you* nothing—but it may well be the first step toward more profitable operations for you. Write us now!

RESULTS

. . . 12,000 piston rings per hour—1,000% increase

By installing a BESLY No. 926 Grinder, equipped with BESLY Titan Abrasive Discs, this automotive parts manufacturer boosted production grinding of piston rings by more than 10 times—sharply reduced costs! Exacting tolerances are maintained.

RESULTS

. . . large castings now ground in 1/7 the time!

Grinding gates for high pressure oil lines, this Texas manufacturer reduced per piece grinding time from 96 to 13 minutes and achieved automatic operation to cut labor costs. Grinder used is a BESLY No. 936 Vertical Spindle Rotary Surface Grinder.

BESLY

CHARLES H. BESLY & COMPANY

TAPS—the world's most accurate tap.

TWIST DRILLS AND REAMERS—Complete line for every need.

TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job.

GRINDERS that reduce costs on every type of surface grinding.

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NEW

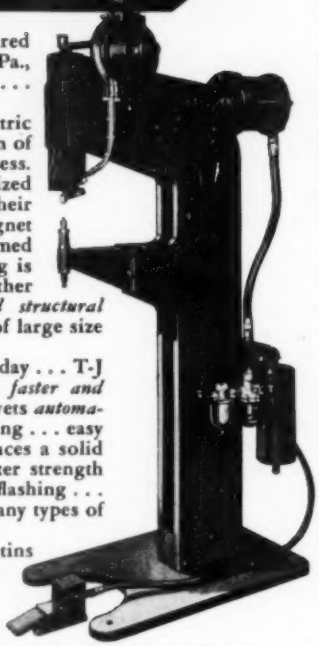
Non-Electric MAGNETS
Completely Riveted by

T-J RIVITOR

This new "Atomagnet" manufactured by Eriez Manufacturing Co., Erie, Pa., has a completely riveted housing . . . with T-J Rivitors doing the job!

The new product is a non-electric Alnico plate magnet for separation of tramp iron from materials in process. The "Atomagnets" are characterized by great magnetic strength for their size—and light weight. The magnet castings are fully encased with a formed cover—and this aluminum housing is assembled with parts *riveted* rather than bolted together for *added structural strength.* Warping and bending of large size magnets are eliminated.

On countless assembly jobs today . . . T-J RIVITORS do the rivet setting *faster and better!* T-J feeds and sets solid rivets *automatically* . . . no manual rivet handling . . . easy for women operators. T-J produces a solid rivet joint of 10% to 15% greater strength —a completely filled hole . . . no flashing . . . a neat balanced head. Handles many types of rivets. Rugged construction . . . T-J dependability. Write for bulletins 646 and 847. The Tomkins-Johnson Co., Jackson, Mich.



AIR POWERED for aluminum alloy rivets up to ¼" diameter or steel rivets up to 1/8" diameter, up to 3/4" long...ELECTRICALLY POWERED for 1/16" to 1/4" diameter solid steel rivets up to 7/8" long. Throat depths, 8" to 36".

33 YEARS EXPERIENCE— T-J

TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHERS

NEW PRODUCTS

For additional information please use coupon on page 56

operator finished only 20 gears per hr., the company reports.

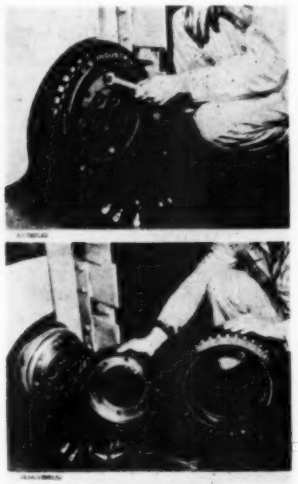
The operator's job is that of placing the gear on the work piece holder, the rest of the operation being for the most part automatic. The holder presents the gear to the brush. The gear is rotated as the surface is brushed. Automatic timers, which are pre-set, determine the length of brushing each gear receives, depending o... type of gear, metal, surface desired, and mthod of application of the brushes.

The new Osborn brushing lathe, adaptable to many sizes of brushes, can be used on a wide range of gear sizes. Operation of the lathe is said to solve the problem of a dull brush.

P-102—Cushion-Style Demountable Tire

A new demountable cushion-style rubber tire to be standard on two of its fork-truck models, and on one of its towing-tractor models, is announced by the Clark Equipment Co.'s Industrial Truck Div., Battle Creek, Mich. The cushion-style rubber tire is to be standard on Clark's Gas Trucloader fork-lift truck in both the 1015 and 1024 models; on its new electric battery-powered Trucloader 1024 model, and on its Clarkette-5 towing tractor.

This demountable tire is said to in-



Clark demountable cushion-style industrial truck rubber tire.

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Crosley Motors, Inc.
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Diamond T Motor Car Co.
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Harry Ferguson, Inc.
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Landis Tool Co.
Lathrop Engine Works
Leader Tractor Co.
Lincoln Electric Co.
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Prominent manufacturers listed at left equip some or all of their vehicles with filters embodying the Fram Principle of Oil Filtration.

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Protect your engines with this same proven method . . . Fram Oil Filtration. Let us show you how Fram Oil Filters, engineered for your specific problems, can add life and cut maintenance on the engines you manufacture. Write for complete details and technical data. FRAM CORPORATION, Providence 16, R. I. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

NEW PRODUCTS

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corporate all the advantages of cushioning, long wear, and cut and chip resistance found in its forerunner, which was pressed onto the wheels. It provides a tapered hard-rubber base reinforced with bead wires, and can be applied to a tapered base wheel merely by bolting together the two wheel halves with a standard wrench. An Allen wrench is used to remove plugs.

Mechanics have been able to remove a used set of tires and mount a set of these new demountable cushion-style tires in fifteen minutes, the company reports. This contrasts with the several hours required to remove and replace the usual type of pressed-on solid tires, the company points out.

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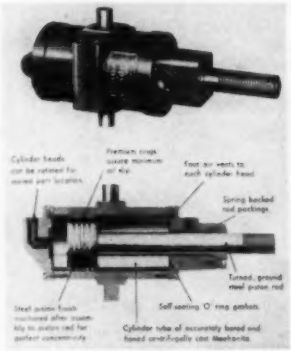
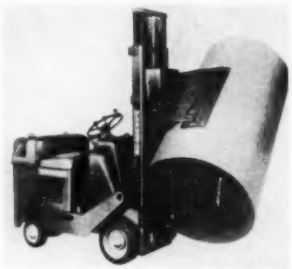
P-103—High Pressure Hydraulic Cylinder



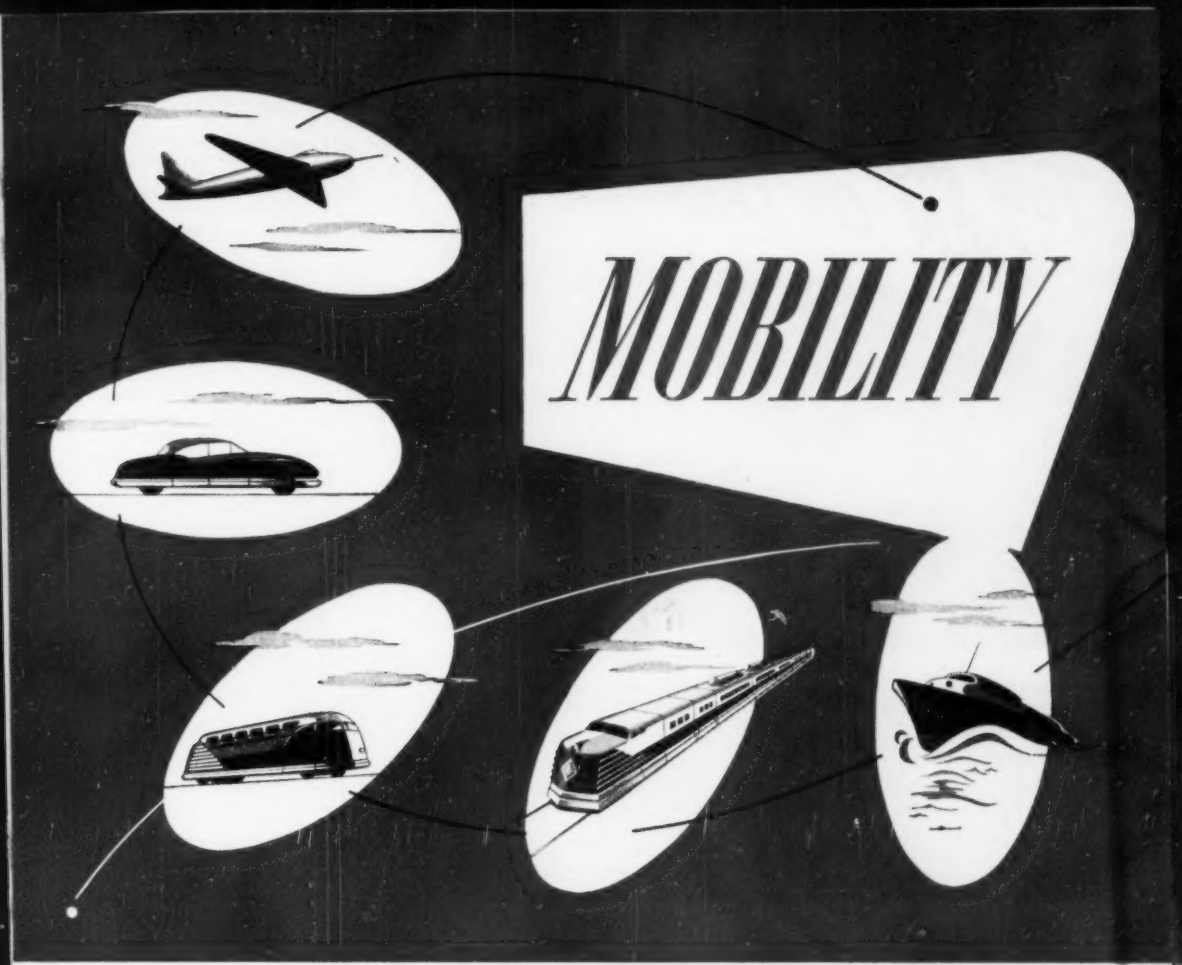
Cross-section and phantom views of Model HP-17, one of a complete line of high pressure hydraulic cylinders meeting J. I. C. standards and manufactured by Hanna Engineering Works, Chicago, Ill. Designed for working pressures up to 1500 psi, these HP cylinders in eight standard mounting styles are used for push, pull, lift, press, clamp or control power.

P-104—Revolving Roll Clamp



Special attachment for safe, rapid handling of rolls of paper, is this revolving roll clamp of Towmotor Corp., of Cleveland, Ohio, which grips a roll weighing up to 2800 lbs and rotates it 360 deg in either direction. Rolls can be picked up from either the vertical or horizontal position and deposited in either position. The fully-revolving feature also enables the clamp to pick up and deposit rolls against walls at either side of a truck. Rolls, with minimum widths of 32 in. and diameters ranging from 30 in. to 44 in. can be accommodated. The attachment consists of one stationary arm and one hydraulically-operated arm which moves laterally from the fully closed position of 29 in. to the fully opened position of 45 in. between the pivoted clamping shoes. The clamp handles newsprint rolls and other cylindrical objects.

(*Turn to page 92, please*)



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For over 30 years, Kent-Moore has engaged exclusively in the development and manufacture of Special-Purpose Service Tools. Time-saving, labor-saving, parts-saving tools which are essential in the maintenance of nearly every type of vehicle . . . automobiles, trucks, busses, aircraft, Diesel engines, rail and marine equipment.

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How about tool maintenance costs in your plant? Chances are, there's an opportunity to make substantial savings in maintenance time and expense, not forgetting that less maintenance means greater productive output, too. Whenever you like, we'll be happy to show you just what Buckeye Tools can do in your plant — there's no obligation, and you'll be the sole judge . . . fair enough?

Buckeye Tools CORPORATION
DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

NEW PRODUCTS

For additional information please use coupon on page 56

(*Continued from page* 90)

P-105—Temperature Control System

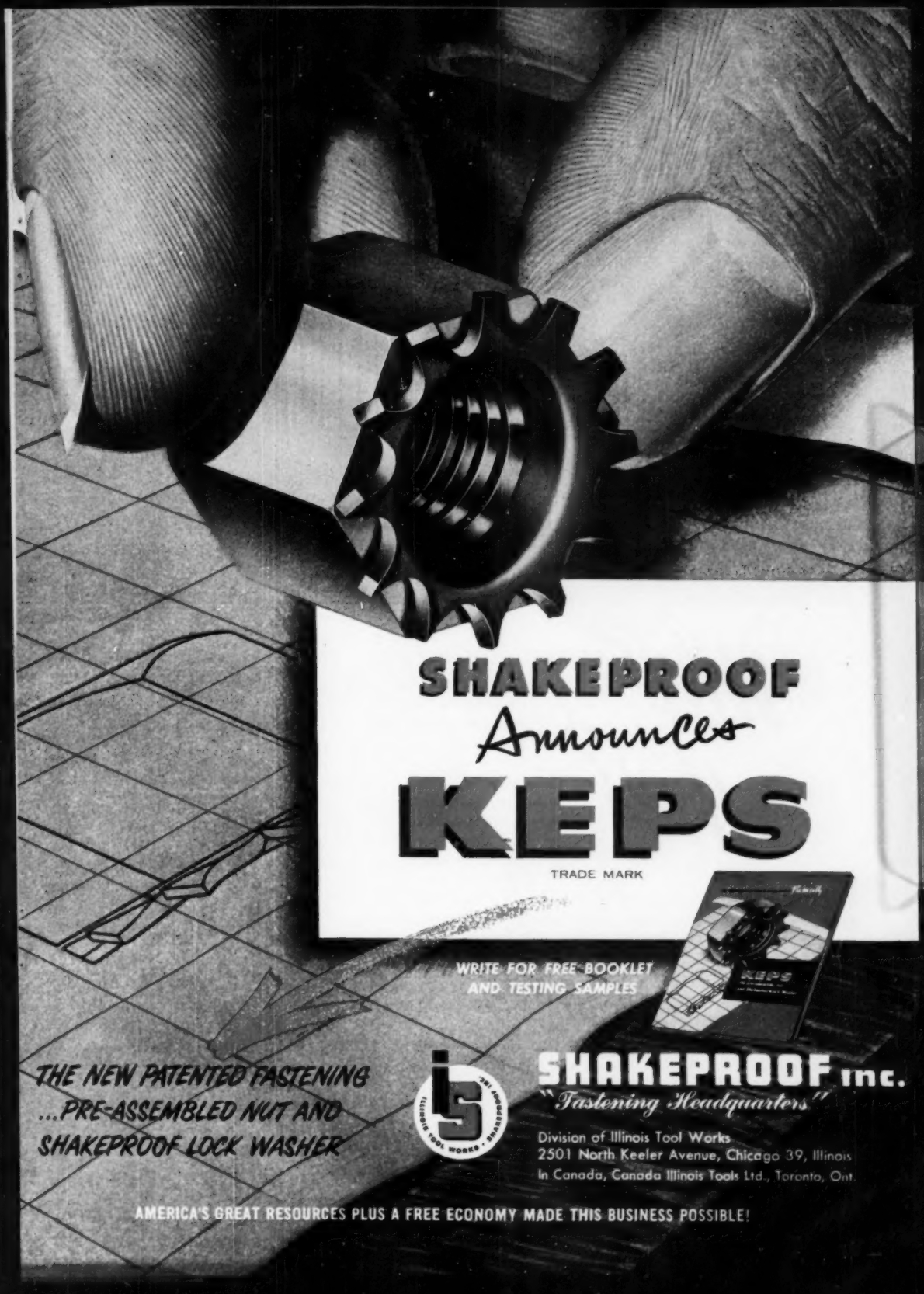
A new control system, made public by Leeds & Northrup Co., Phila., Pa.—P. A. T. '50—for the first time introduces rate action into an electrically-actuated control. The significance of rate action is that it responds according to the speed with which the controlled variable changes—and thus improves process output by reducing the length of time that an upset can force the controlled process off its set point.

Leeds & Northrup furnace temperature electric control system—P.A.T. '50

In operation, if furnace temperature falls, rate action immediately opens the fuel valve. The faster the drop in temperature, the wider the valve is opened. And as the rate of temperature departure decreases, rate action's effect also decreases, to bring temperature smoothly back in line.

Like the previous L&N model, P.A.T. '50 also has proportional and reset control actions, and is applicable to the regulation of temperature, pH, chemical concentration and gas analysis. The key element of the control system is a new control unit, which electrically links a Micromax or Speedomax recording instrument and an L&N electric valve mechanism. Existing P.A.T. installations can have P.A.T. '50 performance by converting to the new control unit.

Offering even greater sensitivity than its predecessor, the new P.A.T. '50 control unit has no moving parts; control action is accomplished by electronic circuits. Valve position can be measured remotely at the control panel without interfering with control action. Major electronic components are plug-in types, easily replaced. The entire control chassis comes out as a unit for inspection.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ESNA's revolutionary new fastening device

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Why?

How?

BECAUSE ROLLPINS ARE:

- . . . CHEAPER TO INSTALL
- . . . LIGHTER IN WEIGHT
- . . . VIBRATION-PROOF
- . . . RE-USEABLE

Rollpins are a new-type, pressed-fit fastener. Chamfered ends permit fast, easy insertion of Rollpins with the use of either hand tools or automatic jig assemblies. Compressed as they are driven into place, Rollpins exert constant pressure against the hole walls—stay permanently in place until deliberately removed with a drift or pin punch.

. . . AND THE INGENIOUS SLOTTED CYLINDRICAL DESIGN ASSURES . . .

- Reduced wear on parts assembled.
- Minimum shear strength exceeding cold rolled pins of equal diameters . . . and an overall reduction in weight of assembled unit.
- Lowered production costs through elimination of reaming and peening operations . . . because Rollpins are self-locking within the tolerance spread of standard production drilled holes.

Rollpins are made from either Carbon Steel or Stainless Steel (also from Beryllium Copper on special order) . . . and are readily available from stock in sizes (diameters) from 5/64 to 1/2 inch and in standard lengths. For full information and test samples, fill in and mail the coupon at right today.

SIMPLIFIED VIBRATION-PROOF ASSEMBLIES • REDUCED WEIGHT

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Straight Pins

1. Easy to drive in pre-drilled hole.
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3. Locks permanently in place.
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Name _____

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Address _____

City _____ Zone _____ State _____

REUSEABILITY • LOWERED COST

Supplies of Non-Ferrous Metals

(*Continued from page 52*)

Let us consider, for instance, that actual consumption of copper by industry in 1949, which could by almost any standard be considered a good year, amounted to an average of 88,000 tons a month. It is encouraging that supplies available during the first eight months of this year averaged about 87,000 tons a month of domestic copper, and there were another 40,000 tons a month of net imports, making available 127,000 tons, a surplus of 39,000 tons over the 1949 rate of consumption by industry.

But the increased military needs for copper under the armament program have been estimated at about 13,000 tons a month. Stockpiling averaged 18,700 tons a month for the first eight months of the year. Assuming a major acceleration of stockpiling to 30,000 tons a month, which it hasn't reached yet, the stockpiling and added military needs become 43,000 tons a month. This subtracted from the current supply level of 127,000 tons a month leaves 84,000 tons a month available for industry as against the average of 88,000 tons consumed in 1949.

Curtailment of Copper Exports

However, this isn't the whole story. Exports are now being rigidly curtailed, and under the stimulus of high prices we may expect that as usual under such circumstances a little additional supply of metal will be somehow squeezed out. Net imports may well be upped to 50,000 tons a month, and domestic supplies about 90,000 tons, for a supply total of 140,000 tons a month which after stockpiling and military needs will leave something like 97,000 tons a month for industry which last year needed only 88,000 tons.

So it seems evident that the wholly abnormal conditions of the recent months, plus the fundamentals of our inflationary position, have caused the illusion of tremendous shortages of copper which in fact do not exist.

In view of present high prices and abnormal demand, we are led to seriously question whether an accelerated rate of stockpiling is justified. Our supplies of copper are of Western Hemisphere origin, and the total production of this Hemisphere has exceeded 2,000,000 tons in several war years—25 per cent more than we used in our heaviest war years—in addition to which the RFC actually accumulated 481,000 tons of copper, beyond requirements, during these years. The fact is that in the event of war, all the stocks of copper in the United States, in anybody's hands, become our stockpile for military purposes and all the production of the Western Hemisphere is at our disposal.

How Much Zinc and Aluminum?

Recent shortages of zinc have been even more acute than in the case of copper. Stocks of slab zinc have been reduced this year from 94,000 tons to 10,000 tons, at the end of September, and they are the lowest they have been in 25 years—less than five days' production. Domestic production has been much below current abnormal demand from industry plus stockpiling. But this industrial demand and stockpiling, as in the case of copper, is as much inspired by fear as anything else, and the stockpiling program in zinc has created a similar situation to that in copper.

For this year, imports of zinc have roughly balanced stockpiling so that the domestic production has been entirely available to industry. This production has been 75,000 tons a month which compares with consumption by industry in 1949 of 59,000 tons a month. So you see that even with increased stockpiling, and increased military needs, there will still be much zinc left for industry.

(*Turn to page 98, please*)

HOW *your* **to Improve Product**

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Product improvement invariably results from the use of Heli-Coil Inserts in all threaded assemblies. The Heli-Coil Insert protects all threads from wear, seizure, corrosion or failure.

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WHY

THIS COMMUTATOR Can Stand The Most Rugged Service, Yet Costs Less To Produce

SMALL MOTOR COMMUTATORS made by the Spring Division of the Borg Warner Corp., Bellwood, Ill., from Revere OFHC (Oxygen-Free High Conductivity) copper, exploded to show method of construction. After copper shell was stamped and formed on multi-slide machine and plastic molding material injected into it longitudinal slats were sawed just deep enough to completely penetrate the thickness of copper and thus form the segments, each of which are insulated electrically from one another and anchored firmly in the plastic.

IT was quite a complex problem the Spring Division of Borg Warner Corp. dropped into the lap of Revere's Technical Advisory Service. They were getting set to manufacture commutators for small motors and they wanted to select the best material for the job.

Here were the specifications: The material had to be the hardest possible yet still able to take the extremely severe forming operation which was to be done in a multi-slide machine. High hardness was necessary in order to combine maximum wear resistance with the ability to withstand the extreme centrifugal force developed in small motors operating at high speeds. In addition, in the molding operation, which is done after the copper shells have been formed, it was necessary to hold the diameter of the shell to within .001" in order to prevent the plastic from flowing between the mold and the outer surfaces of the commutator. An equal tolerance was also imposed upon the height of the solid cylindrical portion for the same reason. Also of great importance was the need for the cylinder wall being almost absolutely flat.

Because of long experience with somewhat similar problems Revere recommended trial of OFHC (Oxygen-Free High Conductivity) copper, four numbers hard. This was tested along with several other metals. The OFHC alone was found to produce excellent parts, and with tolerances so close as to be almost unbelievable in this type of operation. All other types of copper failed at the very sharp bend where the anchoring lugs join the side of the shell.

An unusual feature of these commutators is the plastic material used in the core. Tough, and unusual in composition, it serves both as insulation and as a mechanical connection between commutator and shaft without use of a bushing and key.

To determine if these commutators could *really* take it, test motors in which they were used were speeded up to 35,000 rpm. Although the wiring in the rotors practically exploded at that speed, there were no failures in the commutators, Temperature tests up to 400° F. were also made. Here again there was no damage to the commutator, though the rotor wiring was badly damaged due to the combination of centrifugal force and decrease in wire strength. Once again the unusual combination of properties of Revere OFHC copper had played a part in helping another one of the country's leading manufacturers produce an outstanding product at less cost.

Perhaps this or some other Revere Metal can be of help in improving your product—cutting your production costs. Toward that end we suggest that you get in touch with your nearest Revere Sales Office.

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KESTER SOLDER

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Figures on aluminum are not so precisely available as in the case of the other metals. There are excess fabricating facilities available in this industry, but as in the case of the other metals there is insufficient supply of the raw material for the present level of demand. The principal bottleneck here appears to be electric power, needed in the reduction process and not subject to ready increase. The military program will take a greater proportion of aluminum production than is true of copper, but nevertheless there appear to be enough supplies of aluminum in sight to maintain a substantial industrial level for civilian goods.

Lead is the least scarce of the important non-ferrous metals and does not appear likely to be a problem under any conditions now foreseeable.

This rapid survey has made the point that the current shortages of the nonferrous metals which plague industry are the result of excessive demand from industry and Government. There has been fear-inspired buying; there has been hoarding; and these have caused the shortages. There is actually enough metal to support the 1949 level of civilian output, the present high rate of stockpiling, and military demands as now forecast.

Is the Copper Tariff Necessary?

I think we must look beyond the statistics of industry and the armament program for some of the real root causes of this situation. Here we get into the realm of Government, labor policies and other such considerations.

One of these is the copper tariff. To impose an import tax on copper as was done July 1, 1950, when domestic consumption was 58 per cent greater than domestic production was indeed to reach a low point in statesmanship. You may have noted that one of the statesmen who was active in pleading for the tariff was the one who in the closing days of the recent Congress filibustered against a bill to restrict interstate shipment of slot machines. A "protectionist" where a scarce and vital basic commodity was involved; a "free trader" with respect to "one-armed bandits"!

It is regrettable that one of the large domestic producers of copper and many of the small ones have clung grimly to the position that they needed a tariff — mainly against Chilean copper which actually costs considerably more laid down in the United States than the great bulk of American production — and despite the fact that the President of the United States and his executive departments went on record for suspension of the tariff.

The prospect of the tariff touched off inflation in the copper market even before the Korean outbreak. But copper and the other metals would have been affected in any case. Even without the war in Korea the inflationary trend was

(*Turn to page* 100, *please*)

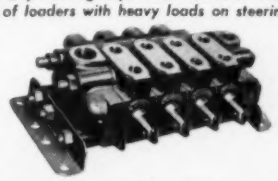
Lull Traveloader

Lull Shoveloader

MORE **Cost-Cutting** APPLICATIONS OF VICKERS HYDRAULICS

Vickers Hydraulic Equipment plays an important part in the performance records that are being reported on these two popular types of materials handling machines. Illustrated below are representative Vickers units used by Lull . . . all are built especially for mobile equipment. These hydraulic controls offer many advantages to both the equipment user and the manufacturer. They assure quick and accurate response to the operator with negligible physical effort . . . they provide inherent overload protection against abuse of equipment . . . they simplify design and save space. Ask the nearest Vickers Application Engineer to call for a discussion of your product improvement problems.

Vickers Steering Booster provides hydraulic power instantly (with no more effort than a "trigger pull") to meet any steering requirement for better maneuverability of loaders with heavy loads on steering axle.



Vickers Multiple Unit Valves consist of individual operating valve sections, assembled in almost any combination (up to 10 sections) for various hydraulic control functions. Vickers exclusive porting arrangement and fully balanced design provides sensitive positioning under actual operating conditions . . . unaffected by surges.

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in evidence, strongly at work to raise prices and aggravate scarcities.

Of all the devices ever invented to rob a working man or a farmer of the fruits of his labor, inflation or depreciation of the currency is probably the most effective and destructive. With every step we take to depreciate the currency, his cost of current living is increased and his savings, his social security and his pensions are decreased in value. The persistency of the Government deficits, which are financed by borrowing which in turn means the running of Government printing presses on irredeemable paper currency of one kind or another, depreciates the purchasing value of the money unit or dollar and thereby increases the cost of commodities and goods in terms of the dollar. We have seen the results of such Government policies and mismanagement in many countries of Europe in recent years and we wonder why the lesson hasn't been learned over here.

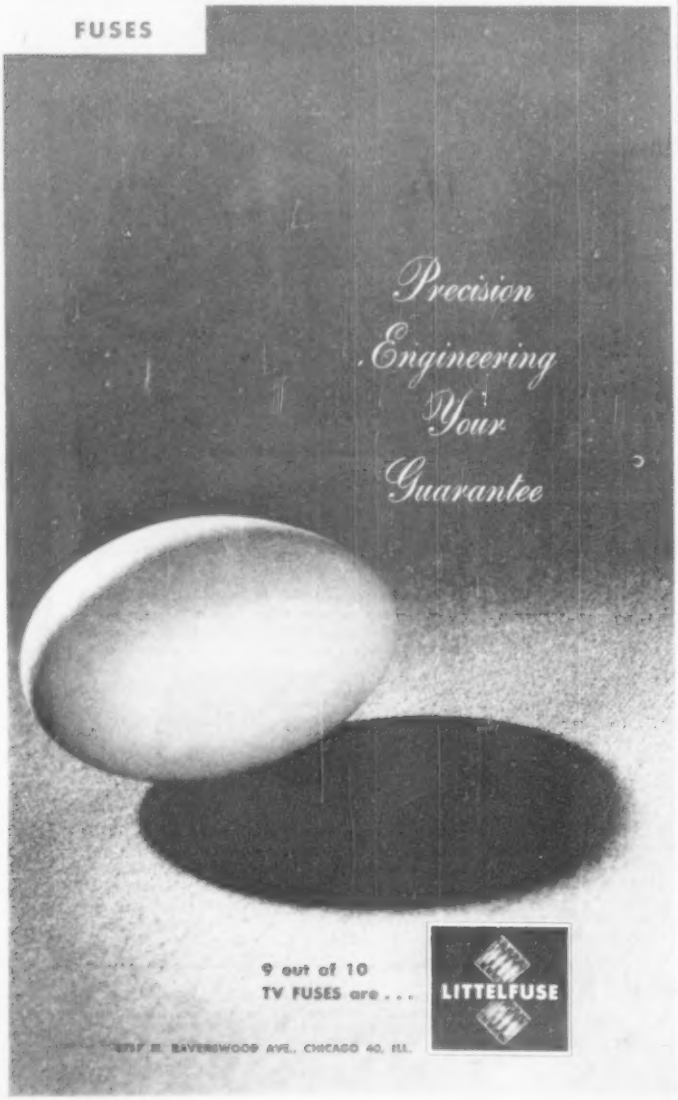
Other causes of depreciation of the currency or inflation include farm subsidies, housing subsidies, artificial low interest rates, and the implementation by politically powerful labor unions of the almost child-like belief of labor leaders that wages can be raised without raising costs and prices.

When we look beyond immediate conditions to fundamentals we find that the capacity of this country is ample for the defense we are planning and for a reasonably high level of civilian production, if only the basic policies are sound. Let us curb inflationary policies, let us face realities and realize that we cannot get something for nothing; let us, in short, trim our demands to our capacities — and then through hard work and self denial if necessary, raise these capacities to new heights for the good of every one of us and for our country.

Our system — so often criticized here — is the envy of the world. If our immigration bars were let down, not all the ships on the seas could in a hundred years carry all the people who would want to come here to live. But a single ship could carry all who wish to leave in one voyage.

These are thoughts that need to be spread. There are very many who do not really understand what made the United States great and what it stands for, and there are too many others who do understand it but who do nothing to spread understanding of our system or to defend it and help to keep it sound and workable. If American industrialists do not do this job, who should do it, who can do it, or who will do it?

The foregoing article is from a talk by Mr. Dallas at the recent National Metal Congress in Chicago.



Importance of Chemical Products

(*Continued from page* 47)

all the others. The problem of future fuel supply is a chemical one. As the chemical industry is faced with shortages or depletion in the supply of any one of dozens of raw materials, it will be a problem for the chemical industry to develop substitutes or new sources of supply.

This article is an extract from a paper presented by Mr. McCuen at a recent meeting of the Commercial Chemical Development Assn. and the Chemical Market Research Assn. at Washington, D. C.

Read
AUTOMOTIVE INDUSTRIES
Regularly and Thoroughly

Inclusion-free high-carbon ferro chromium

assured by new process

MOST ball and roller bearings must take terrific punishment in service, and their dependability is based directly upon the quality of steel from which they are made.

To meet the requirements of the bearing manufacturer and his customers, the steelmaker can rely upon our newly improved ferro chromium to help him produce consistently high grade bearing steels.

The high-carbon ferro chromium we have recently developed is exceptionally free from non-metallic inclusions, entrapped slag and dissolved gases. It is made by a new process* which includes filtering out harmful inclusions by pouring the metal, as tapped from the furnace, through a layer of molten slag of special composition. In addition to removing the undesirable inclusions, this process also assures greater density of the metal and the absence of shrinkage cavities in individual lumps.

High-carbon ferro chromium contains 66 to 70 per cent chromium, 4 to 6 per cent carbon, and 3 per cent maximum silicon.

Our technical staff will be glad to demonstrate to you the benefits to be gained in your steelmaking by the use of this improved high-carbon ferro chromium.

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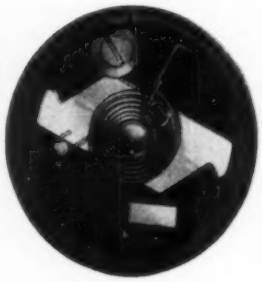
Exclusive Sisson ELECTRO MAGNET goes into action when you step on the starter. Closes choke valve to proper position required by engine temperature. Assures correct choke for fast starting at any temperature without flooding

Controlled thermostat action (exclusive with Sisson) flattens the choking curve during critical warm-up period. Finest quality thermostat metal in extra strong spring assures more accurate and more positive control of choke valve.



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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity rose slightly during the week ended Oct. 21. Increases were reported in bituminous coal production, railway freight loadings, and crude oil output, while department store sales, construction, and electric power production declined somewhat. For the week ended Oct. 21, the *New York Times* index of activity stands at 163.9, as compared with 163.3 in the preceding week and 131.5 a year ago.

Production of bituminous coal and lignite in the same period is estimated at 11,750,000 net tons, 250,000 more than the output in the week before and 9,279,000 above the comparable amount last year.

Railway freight loadings totaled 890,990 cars, 0.3 per cent more than the figure for the week before and 51.2 per cent above the corresponding number a year ago.

Crude oil output in the week ended Oct. 22 averaged 5,902,200 barrels daily, 40,450 more than in the preceding week and 830,100 above production for the similar period in 1949.

The dollar value of department store sales in the week ended Oct. 21, as reported by the Federal Reserve Board, was equal to 305 per cent of the 1935-39 average, as compared with 322 in the week before. At this level, the value of sales was three per cent more than in the comparable week of last year. The total reported since the beginning of the year was five per cent more than the corresponding sum in 1949.

Civil engineering construction volume reported for the five-day week ended Oct. 26, according to *Engineering News-Record*, was $245 million as compared with $261 million in the week preceding. The total recorded since the beginning of the year, at $9.9 billion, is 48 per cent more than that in the corresponding period of 1949.

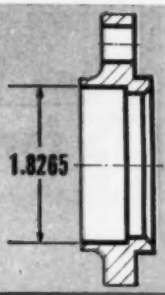
Production of electric power declined slightly during the week ended Oct. 21. At 6503 million kilowatt-hours, total output was 19.7 per cent above the amount a year earlier, as compared with an advance of 18.8 per cent shown in the preceding week.

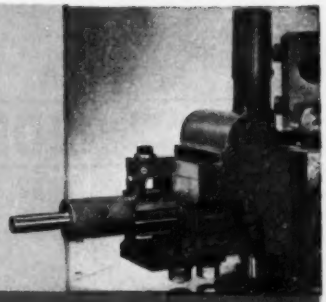
The wholesale price index of the Bureau of Labor Statistics for the week ended Oct. 17, at 168.9 per cent of the 1926 average, was 0.1 per cent more than in the preceding week and 10.8 per cent above the comparable figure for 1949.

Member-bank reserve balances decreased $596 million during the week ended Oct. 25. Underlying changes thus reflected include decreases of $673 million in Reserve-bank credit, $107 million in money in circulation, $29 million in Treasury deposits with Reserve banks, and $13 million in Treasury cash. An increase of $73 million in nonmember deposits and other Federal Reserve accounts was also reported.

Total loans and investments of reporting member banks increased $178 million during the week ended Oct. 18. An advance of $5 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at $16,147 million, were $2500 million more than the comparable sum a year ago.

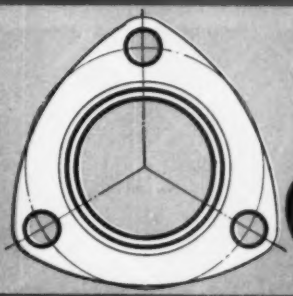
BIG SAVINGS

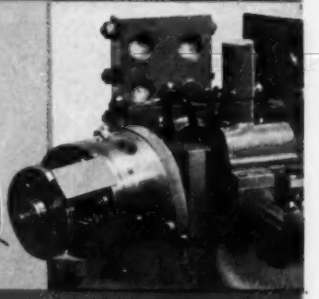




IN TIME • IN FLOOR SPACE • IN MACHINE INVESTMENT • IN LABOR COSTS

ON SMALL WORK





CASTINGS, FORGINGS AND CUT OFF BAR STOCK

WITH THE POTTER & JOHNSTON 3U AUTOMATIC

The combination of skillful P&J Tooling on the flexible P&J 3U Automatic makes this class of work most profitable. Note that the 1.8265 inch bore is larger than the diameter presented to the turret; the tool that takes the cut is the single point back boring slide illustrated in the upper photo. The lower photo shows the Multiple Spindle Drilling Attachment which indexes into exact alignment to engage with the chuck and drill the 3 flange holes simultaneously and without extra handling. Altogether, nine boring, turning, facing, beveling and drilling operations (as indicated by the heavy lines) are completed in a single chucking. Cutting cycles are fully automatic, as are all feed and speed changes; one operator easily handles a battery of 3U's, thereby spreading labor costs. Send parts or prints to P&J for tooling recommendations and detailed time estimates.

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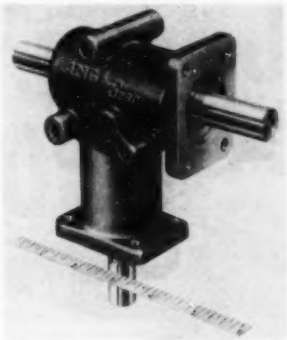
NEW PRODUCTS for AIRCRAFT

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

U-22—Single Hp. Angle Gear

Airborne Accessories Corp., Hillside, N. J., announces development of a one hp model of the ANGLgear for use in either manual or power operated systems. Production tested and rated at 750 in.-lbs static torque, the new ANGLgear provides shaft diameters of ⅝ in. Special units with special shaft extensions can be furnished. The new

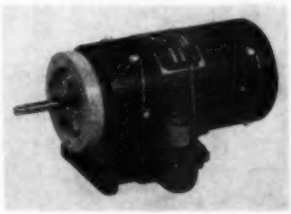


Airborne ANGLgear, Models R-320 and R-330

ANGLgear models R-320 and R-330, are available in either two-way or three-way units with a standard 1 to 1 gear ratio and a 2 to 1 reduction as an optional feature.

U-23—Precision-Built DC Motors

Lear, Inc., Grand Rapids, Mich., is producing a new line of small lightweight, precision-built dc motors available in continuous duty models with rated outputs to 0.5 hp, and intermittent duty models with rated out-



Lear small precision-built DC motor, Model CA-148-3

For That NEW Transmission Problem — Better Consider
the advantages of using ROCKFORD engineered-to-the-job CLUTCHES. Whether single or double plate, or multiple-disc type, they conserve both power and space because they deliver maximum torque with minimum size and weight, and fit compactly into product design. Send a sketch or print of your new transmission for our engineers' recommendations covering the size and type ROCKFORD CLUTCH that will meet the needs of your product exactly.
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1. Solid, large, connecting links speed the flow of current.
2. Double-pour leak-proof seal
3. Stop-spill safety vents
4. Life-anchor posts cast in one piece with separator hold-downs
5. Flex-rubber bushings absorb shock, prevent leakage
6. Large space for acid above plates
7. Plates securely burned to post straps
8. Spintex rubber separators or finest wood individually candled
9. Perma-set, "craterized" plates
10. Pebble-coated interlocking v-shaped grid bars
11. High tensile strength container
12. High foot rests for plates

Uniformity of quality is characteristic of Globe-Union batteries regardless of which of the 12 Globe-Union factories produce the batteries. Strategically placed local factories insure lowest freight costs and faster service.

How an ALLITE* DIE

This Allite die—for experimental sections of an automobile fender—is typical of the many produced in Allied's well-coordinated foundry and die shop. Because of the intricacy of the draw and unusual contours of the part, the precision cast Allite die provided a simple and economical method of developing the proper die design.

And, in addition to these savings, the experience gained in fabricating and pre-testing of this inexpensive Allite die also aided considerably in reducing the cost of the permanent steel die later built for volume production of the part.

We can show you many other examples of how close coordination of foundry and die shop facilities results in lower tooling costs, better built tools, faster production starts. Why not write us today for the full story on *all* the advantages of Allite dies. They may hold the solution to your experimental or production die problems.

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ALLIED CORPORATION PRODUCTS — PRECISION · EXPERIENCE · DEPENDABILITY

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Are precision cast for low cost tooling. The material used is any formula of zinc alloy (Kirksite, Dimetal, etc.) which meets your requirements.

HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • ALLITE ZINC ALLOY DIES • JIGS • FIXTURES • R-B INTERCHANGEABLE PUNCHES AND DIES

puts to 2 hp. These high-speed 26-volt dc motors are corrosion resistant and designed to operate over an ambient temperature range from —65 F to ±165 F. Engineered to meet a wide variety of aircraft and industrial applications, the series are available with any of the following options to insure optimum matching of motor to application with minimum design costs:

Fastop clutch gives positioning control of devices of friction load type. Electromagnetic brake is for the positioning control of small motor applications which require extreme holding torque or impose large load inertias on the motor. A thermal protector, load and temperature - sensitive, protects motors under conditions of maximum stress. Either a flange or base type mounting is optional for all type motors. And a radio noise filter, designed to meet specification ANM-40, may be installed integral with the base type mounting.

BLAST CLEANING

(*Continued from page* 49)

shot has shown unusual durability. Over a test period of two months the percentage of shot retained on a 0.0469 in. screen has run an average of 80 per cent, the percentage of fines being quite small.

While considerably more experience will be required before reliable figures are available as to the relative cost of blasting and pickling, initial comparison based upon two months operation shows that costs with the new method are running about 41 per cent of overall pickling cost. In making this comparison the following cost elements have been considered: Maintenance labor, maintenance material, productive labor, material (shot or acid), and power.

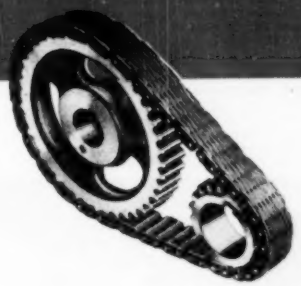
Since the axis of the barrel is horizontal, the flow of forgings is determined entirely by the movement of forgings from the charging conveyor. The barrel contains two Rotoblast units and a number of drums connected by slat conveyors for transporting work from drum to drum. Lifting cleats on the inner drum face tumble the work through the blast patterns to each wheel, assuring complete cleaning of the load.

The end drum is spirally sealed from blast action and within it the load is tumbled thoroughly to remove all abrasive. The abrasives then are returned automatically to the reclamation system for re-use. For this purpose the machine is equipped with a special abrasive separator which collects the abrasive, cleanses it of refuse and fines, and returns usable abrasive to storage bins.

11 out of 13 prove

M=TC

Morse means Timing Chains to the Automotive Industry



Thirteen makes of present-day automobiles use timing chains as original equipment. Of the thirteen, eleven makes use *Morse* Timing Chains exclusively. ANOTHER REASON WHY MORSE MEANS *UNQUESTIONED* LEADERSHIP IN AUTOMOTIVE TIMING CHAINS.

MORSE

MECHANICAL
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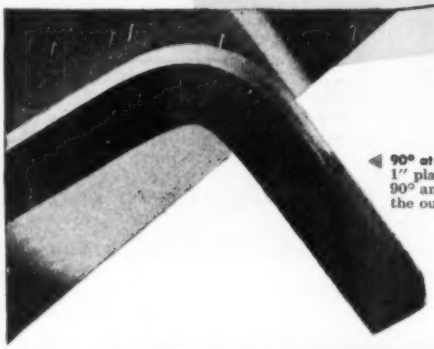
Announcing... U·S·S

A NEW HEAT-TREATED ALLOY STEEL WITH

MECHANICAL PROPERTIES—U·S·S Carilloy T-1 Steel can be furnished Heat Treated to the following mechanical properties:

	Thickness ¼" to 2" incl.	Thickness Over 2" to 4" incl.	Thickness Over 4" to 6" incl.
Yield Strength, 2% Offset (min.)	100,000 psi	90,000 psi	90,000 psi
Tensile Strength (min.)	115,000 psi	105,000 psi	105,000 psi
Elongation in 2", % (min.)	18	17	16
Reduction of Area, % (min.)	55	50	45
	Thickness ¼" to ½" incl.	**Thickness Over ½" to 1" incl.**	**Thickness Over 1" to 2" incl.**
Cold Bend	180°D=1t	180°D=2t	180°D=3t

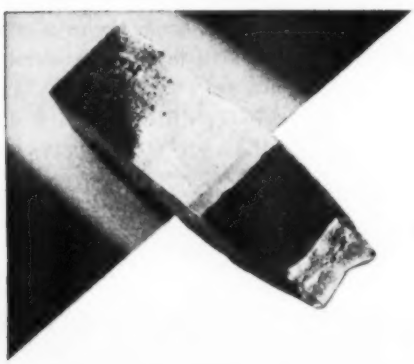
(Testing in accord with A.S.T.M. recommended practices.)

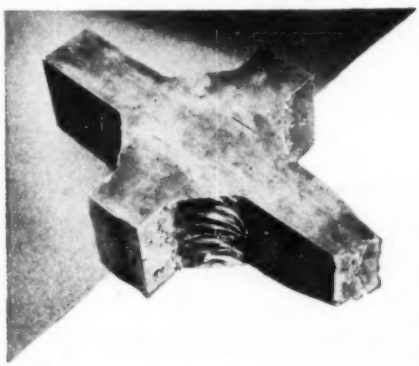


Look at these test results:

◀ **90° at 98 below!** The sample here was flame-cut from 1" plate. Then it was chilled to −98°F, and bent to a full 90° angle. Even though the raw, flame-cut edge made up the outer radius of the bend, there was no sign of failure!

▼ **100% WELD STRENGTH**—Tensile tests on welded specimens like these prove that welds on CARILLOY T-STEEL are 100% efficient. Welds develop the *full* strength of the parent metal. Note that breaks occur outside the heat-affected zone. No special pre-heating or post-heating treatments are required beyond those used with ordinary structural steels.





Carilloy T-steel

THIS REMARKABLE COMBINATION OF PROPERTIES

1. High yield strength of 100,000 psi minimum.

2. Strong and ductile even at 100 below zero!

3. Readily weldable - - without loss of strength or ductility.

HERE is a new alloy steel developed especially for heavy-duty equipment that must withstand a lot of abuse in all sorts of climates — in the scorching heat of summer and the bitter cold of winter — yet with all this, it's a steel that can be easily gas-cut and readily welded.

U·S·S CARILLOY T-STEEL was developed by Carnegie-Illinois research. It provides a unique combination of superior strength and unusual ductility. This low carbon *alloy* steel can actually be welded and gas-cut as readily as structural *carbon* steel.

Plates of CARILLOY T-STEEL from ¼" up to 2" in thickness have a minimum yield strength of 100,000 psi even *after* welding and gas-cutting. Despite this very high strength, T-Steel will remain tough and ductile at any climatic temperature. That's why CARILLOY T-STEEL is made to order for heavy-duty equipment that must operate out-in-the-open under high impact loads and without danger of failure.

The *full* strength of CARILLOY T-STEEL can be utilized in designing welded construction because the high physical properties are not affected by welding or gas-cutting.

U·S·S CARILLOY T-STEEL has been developed for use in the form of plates and bars. Its nominal hardness is 250 Brinell. For abrasive conditions, where high hardness *and* toughness and weldability are essential, hardness up to 320 Brinell minimum can be furnished.

SEND THE COUPON

Carnegie-Illinois Steel Corporation
Room 4208, Carnegie Building
Pittsburgh 30, Pa.

Please send me a copy of the Carilloy T-Steel booklet.

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CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH
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USS Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH · COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

UNITED STATES STEEL

New Budd Foundry

(*Continued from page 33*)

has a large pit at one end and an elevator leading from the pit to a sand return belt overhead. Sand temperature is never more than 15 F above room temperature.

For the present, only 35 tons of sand per hour are used which allows two tons for spill and miscellaneous loss.

The molding conveyor is 472 ft long and is adjustable to run from 5 to 25 fpm. Pendulum type hangers are used and they are guided at the floor in various locations so the conveyor does not swing. This conveyor is used for more than one purpose. The vertical hanger is equipped to carry the flask clamps, closing pins and locating plug for the backup plate, as well as the flask returning from the shakeout room. By making this conveyor do several operations, the materials are always in front of the operator, thus eliminating the necessity for any auxiliary conveying devices.

Operations Along the Conveyor

Operation	Length Allotted (ft)
Molding	112
Pouring	45
Smoke hood	228
Shakeout room	30
Return	57

As empty flasks move along the molding conveyor, they are picked up and placed in an Osborne jolt squeeze stripper molding machine. Eight of these machines are installed on the production line and each pair turns out 125 molds per hour—one machine makes 125 copes while the other makes 125 drags.

After molding, the flask is again placed on the molding conveyor and a two-lb steel backup plate, along with a strainer core, is inserted in the drag mold. Later, when cast iron is poured around the backup plate the brake drum and backup plate become securely fused together. In the next operation, the cope is set in place on the drag. Strainer cores are manufactured on an Osborne core making machine and baked in a propane-fired core oven. They are 2½ in. diam by ⅝ in. thick and contain 16 holes of 3/16 in. diam.

Metal is poured just before the molds reach the smoke hood, and the pouring operator works in a direction against the movement of the molding conveyor. Pouring ladles travel along a 145 ft long conveyor which is made in the form of a loop. When the ladle is empty, the operator can circle around to obtain more molten metal from the cupola.

Two Simplicity shakeout machines, located in a room 11 ft above the main foundry floor, shake out the molds after they pass through the smoke hood. Molds are removed from the conveyor and pushed into the shakeout machines by a ram.

There are two rams, one at each pushoff point, and they are equipped with a six-in., air-operated piston. This arrangement is another Budd innovation that has been used by the Red Lion foundry with a great deal of success. The ram is constructed with two tongs so that when the conveyor hanger pipe support passes the pushoff point, the operator presses a button and the forked ram engages both sides of the pipe support and touches the flask in two places while it is being pushed off.

Castings discharged from the shakeout machine are vibrated to the sprue apron conveyor where the brake drum is picked off and placed on a cooling conveyor. This sprue apron conveyor is a labor saving device, since the sprue after being removed from the casting in the shakeout is not touched by hand as it progresses to the foundry return stockpile in the charging yard. Sprue continues on the conveyor and 400 lb batches of it are dumped into buckets which convey it to the charging yard. These buckets can be automatically set so that the sprue is dumped either on to the iron charging platform or in a pile adjacent to the platform, where it can be picked up by an electro magnet.

(*Turn to page 112, please*)

To make
HARDENED & GROUND PARTS
Requires EXPERIENCE!

NOTHING we make tells a more complete story of quality than the king pin shown here—involving expert knowledge of materials; close-limit, intricate machining; scientifically controlled heat treatment; and micro-finish grinding. Result: A product in which both automotive manufacturers and ultimate users can have the utmost confidence.

Our specialization of over 40 years has earned us many satisfied customers among makers of trucks, tractors, trailers, buses, axles, off-the-road machines, and Diesel locomotives. We would like to have you consider Brown Hardened and Ground Parts for your own requirements. Please write or wire.

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Parts include . . .
King Pins
Shackle Bolts
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. . . anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.

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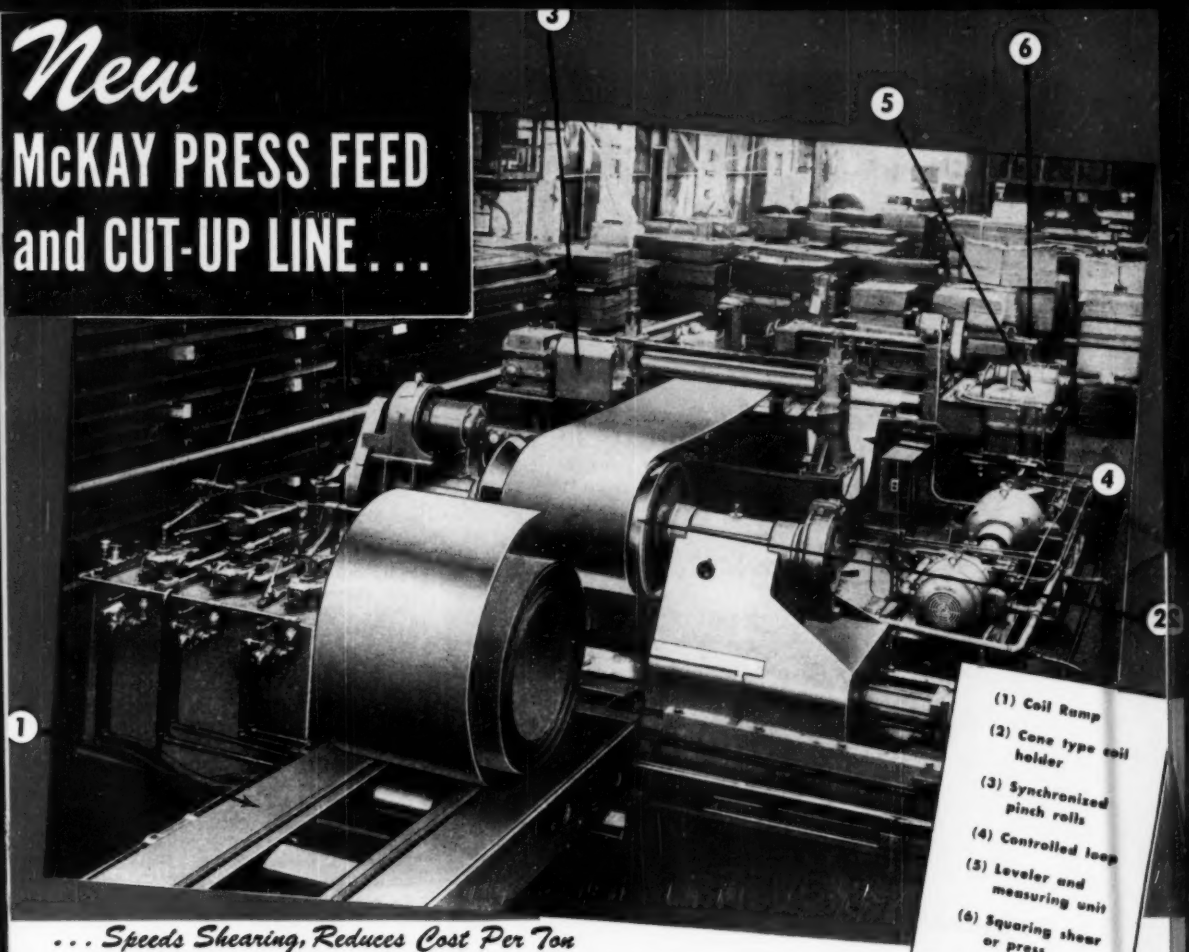
New McKAY PRESS FEED and CUT-UP LINE . . .



. . . *Speeds Shearing, Reduces Cost Per Ton* for BRIGGS MANUFACTURING COMPANY

THE Briggs Manufacturing Company, one of the leading producers of automobile bodies and plumbing fixtures, has recently installed a 48″ wide McKay press feed line to speed coil shearing at its new Youngstown, Ohio, plant.

On one production run, Briggs sheared 215 tons of 36″ wide, 48″ long, 14 gage sheets from coil, in 16 hours operation. On another occasion 17,000 cuts were made on a two shift basis. Although these production figures do not represent the absolute capacity of this line, they do indicate the dependability and ruggedness of McKay equipment.

The installation illustrated above utilizes hydraulic drives and hydraulic control equipment. Similar lines using electrical drives and electrical control are available.

All equipment illustrated above is applicable to a press feed line merely by substituting a press in place of a shear.

Consult McKay engineers if you have a press or shear feeding problem.

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THE ARISTOCRAT
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Sand falling through the shakeout machines is collected in a hopper and discharged to an inclined magnetic belt conveyor for reprocessing.

A 90 min cooling time is allotted, in which the hot castings pass on the outside of the building, between the time the casting leaves the shakeout machine and is taken from the 850 ft cooling conveyor in the cleaning room.

Primary cleaning is performed on a Pangborn nine-ft diam multi-spindle Rotoblast table machine—two of these machines have been installed, but one is used as standby equipment. When the Rotoblast operator is finished, the casting is again placed on the cooling conveyor. Another worker removes the casting and either grinds or chips off any excess metal. Castings are also inspected in this section, and then delivered to the shipping department.

All equipment which requires unusual maintenance is located above the foundry floor where sand cannot pile around it. Workmen, therefore, can work under ideal conditions when making preventative maintenance inspections. The equipment itself operates more satisfactorily and is subject to less wear.

A feature of the foundry is its 2¾ in. thick gypsum roof which retards the summer heat from entering and which also retains the heat in winter.

Another feature of which Budd officials are justly proud is the dust removal system which was supplied by the Claude B. Schneible Co. This dust, smoke and fume removal system cleans the air to such an extent that one is seldom conscious that he is in the vicinity of foundry operations.

London Show

(*Continued from page* 36)

replaced by the Nash Ambassador unit, the Nash transmission and rear axle. These units are imported, fitted into the Healey chassis carrying an English-built, four-passenger body and re-exported to the United States, where they are distributed by the Nash Export Division to all countries except Great Britain and France.

Lagonda and Aston Martin, now controlled by the David Brown Co., of Huddersfield, work from the original designs laid down by W. O. Bentley, and presented the Vantage six cylinder sports engine of 157 cu in. developing 120 hp. This engine features two overhead camshafts, a light alloy high compression head and a special induction and carburation system.

Lanchester, in the Daimler group, introduced a new "Fourteen" with a four-cylinder valve-in-head engine of 120 cu in., featuring a fluid flywheel. Wilson pre-selective planetary transmission and Hotchkiss drive. This is the smallest engine built with a fluid

(*Turn to page* 114, *please*)

Black & Decker Tool Users . . .

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Chicago, Ill.	New Orleans, La.
Cincinnati, Ohio	New York, N. Y.
Cleveland, Ohio	Philadelphia, Pa.
Dallas, Texas	Pittsburgh, Pa.
Denver, Colo.	Portland, Ore.
Detroit, Mich.	St. Louis, Mo.
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You get maximum productive life out of every Black & Decker Tool you own when you take advantage of our genuine, guaranteed "Factory Service" at reasonable cost! These Factory Service Branches are *owned and operated by Black & Decker,* not merely local repair shops "licensed" by a manufacturer. They carry genuine B&D parts in stock, use no substitutes or makeshifts. And you deal *directly* with Black & Decker, enjoy all the advantages of B&D's famous service policy and guarantee.

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. . . And Each Service Branch is

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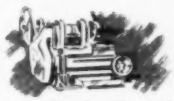
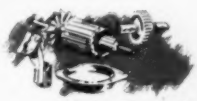


. . . equipped with special electric tool servicing equipment for finer repair work.



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flywheel. Another engine feature is the use of dry liners. Front suspension is by means of wishbones and laminated torsion bars mounted fore and aft inside the box section side rails.

Although a high spot for the Britishers, the Triumph roadster had already been seen at Paris. This is based on the Vanguard chassis, built by Standard, and features an overhead valve engine with twin carbureters developing 71 hp at 4200 rpm. It incorporates the Denormanville overdrive, now built by Laycock, but the outstanding feature is the styling of the three-passenger roadster body.

Men in the News

(*Continued from page* 25)

General Electric Co., Chemical Dept. —**Frederick R. Cronmiller** has been appointed supervisor of budgets and planning for the Chemical Dept.

General Tire & Rubber Co.—The appointment of **A. Ray Carr**, to Manager, Kraft Service and Accessory Sales is announced. The move marks Carr's third promotion in five years. He was formerly Manager of Sales Promotion.

Heppenstall Co.—**Raymond T. Porter** has been appointed eastern Sales Manager of Heppenstall Co., Pittsburgh, in general supervision of die block, shear knife, tongs, rings and other forging sales throughout the company's Boston, Bridgeport, New York and Phila. sales districts.

Motorola—The appointment of **John F. Byrne** to position of Associate Director of Research in the Division of Communications & Electronics, is announced. Since 1945, Mr. Byrne has been Vice President and Chief Engineer of Airborne Instruments Laboratory, Inc., at Mineola, N. Y.

National Automotive Fibres, Inc.—The appointment of **George W. Parkin** as Assistant Sales Manager of the company's Automotive Division is announced. Parkin, who will make his headquarters in Detroit, has been with the company twelve years. Since 1943 he has been division manager at Trenton, New Jersey.

Ryan Aeronautical Co.—**W. T. Immenschuh** has been promoted to Executive Engineer, principal aid to the Director of Engineering.

Synthane Corp. — Appointment of **Charles H. Cox, Jr.**, as Purchasing Agent to succeed **Samuel M. Fox**, who retired recently, is announced.

Thermoid Co.—**William A. Blume** has been elected a Vice-President, to be in charge of Thermoid's original equipment business for the automotive industry in Detroit, Mich. He was previously President of the American Brakeblok Div. of American Brake Shoe Co. and a Vice-President of the parent company.

Trundle Engineering Co.—**Arthur P. Wilson**, formerly vice-president of Frank C. Brown & Co., New York management counselors, has joined the staff of the Trundle Engineering Co., consulting management engineers of Cleveland, Chicago, New York, and Washington.

Warner Electric Brake and Clutch Co.—Appointment of **Roger H. Brown** as eastern Sales Manager for the firm's ICB Division, is announced. Brown formerly handled engineering sales of the company's industrial clutches and brakes in the New York area. New York sales will henceforth be handled by **R. C. Wiard** and **W. E. Gregg**.

Western Gear Works—**John E. Oliver** has been appointed administrative assistant to the general manager.

Westinghouse Electric Corp. — **Dr. John W. McNall** has been appointed di-

(*Turn to page* 116, *please*)

Check These 6 Advantages of Redesigning Your Product with a...

Lamb Electric SPECIAL APPLICATION MOTOR

Sturdy and reliable, explosion proof construction, helical geared fuel transfer pump motor.

Aircraft hydraulic pump motor with maximum output, minimum weight. Adaptable to many heavy-duty industrial applications.

By using Lamb Electric *motor parts* or a complete *frame motor* —engineered for the *exact* requirements of your application—you may gain these advantages:

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3. Thorough dependability.

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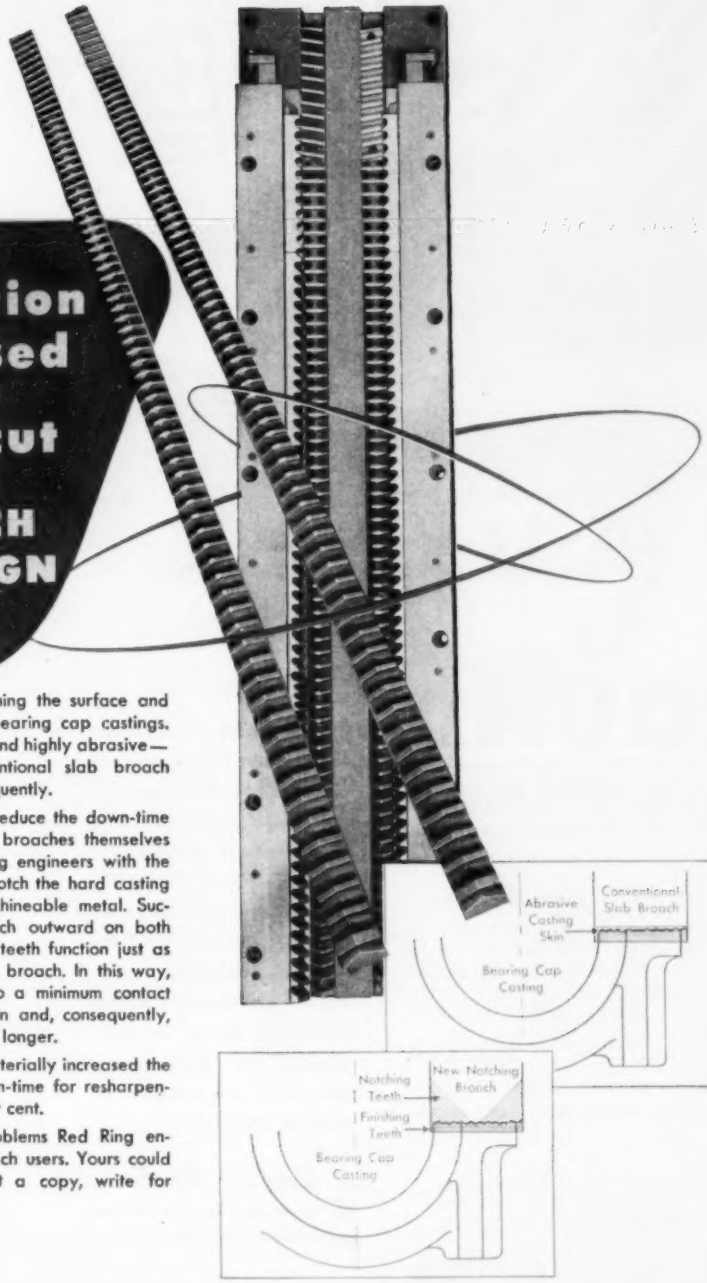
Our engineering department will be glad to team up with yours to help achieve these results. *The Lamb Electric Company, Kent, Ohio.*

They're Going Into America's *Finest* Products

Lamb Electric SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

Production increased and costs cut by BROACH REDESIGN



The job in question is broaching the surface and edges of automotive main bearing cap castings. The surface skin is very hard and highly abrasive—so much so that the conventional slab broach requires sharpening very frequently.

To get more production and reduce the down-time for regrinding broaches, the broaches themselves were redesigned by Red Ring engineers with the forward teeth V-shaped to notch the hard casting surface down to readily machineable metal. Successive teeth extend the notch outward on both sides while the final finishing teeth function just as those of a conventional slab broach. In this way, broach teeth are exposed to a minimum contact with the abrasive casting skin and, consequently, hold their cutting edges much longer.

These new broaches have materially increased the parts per grind and the down-time for resharpening has been reduced 70 per cent.

This is one of the many problems Red Ring engineers have solved for broach users. Yours could be the next. If you haven't a copy, write for Bulletin 49-11 on broaching.

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½" to 2" 20 gauge 1" to 2¾", 14, 16, 18 gauge

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vision engineer of the research department of the Westinghouse Lamp Div., Bloomfield, N. J. He will direct the electron emission, gas discharge and physical measurements sections of the department. **William C. Lilliendahl** has been appointed research advisory engineer for the Westinghouse Lamp Division, Bloomfield, N. J. He will direct the metals section of the research department.

Worthington Pump and Machinery Corp.—It is announced that **Austin C. Ross** has been elected a vice president and will continue to serve as Buffalo works manager of the company.

The Carpenter Steel Co.—**H. Sturgis Potter** has been appointed General Sales Manager to succeed **R. V. Mann**, who until his recent death was Vice President in Charge of Sales.

E. W. Bliss Co.—Announcement is made of the election of **Colonel Willard F. Rockwell**, Chairman of the Board of Rockwell Mfg. Co., to its Board of Directors and to membership on the Executive Committee. Colonel Rockwell is also Chairman of the Boards of Timken-Detroit Axle Co., and of Standard Steel Spring Co.

Texas Engineering & Mfg. Co., Inc.—Heading the list of announced promotions is the elevation of **John A. Maxwell, Jr.**, formerly Administrative Assistant to the President, to position of Works Manager; and the appointment of **Otto Witbeck**, formerly General Superintendent, to position as Factory Manager. **J. C. McKelvain** has been advanced from Chief Inspector to Director of Quality Control; and **C. D. Collier**, promoted from Purchasing Agent to Director of Materiel.

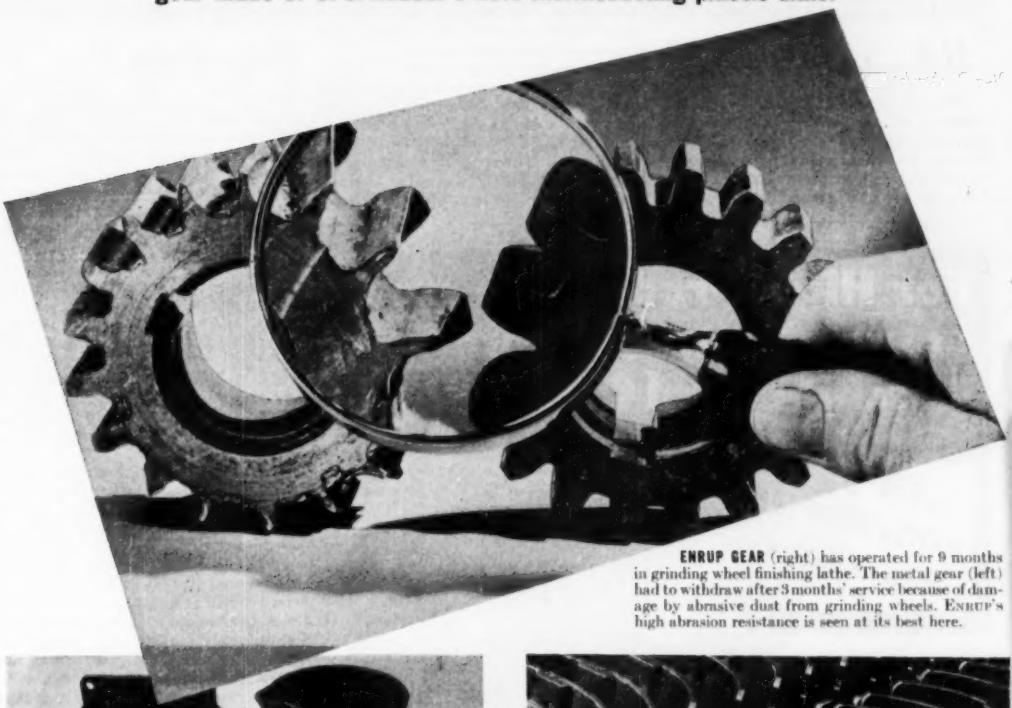
BOOKS . . .

STRENGTH OF STAINLESS STEEL STRUCTURAL MEMBERS AS FUNCTION OF DESIGN, by *Michael Watter* and *R. A. Lincoln*, published by *Allegheny Ludlum Steel Corp.*, Pittsburgh 22, Pa. As a textbook or reference for designers who are using or planning to use cold rolled, high tensile, chrome-nickel stainless steel in structures carrying calculated loads, the book presumes a knowledge of mechanics and stress analysis. A method of stress analysis is developed and checked against empirical results and nomographs are given to aid the designer. The procedures put forth in the book should allow designers to explore additional applications of stainless steel for airplanes, buses, railroad cars, bridges, and similar applications.

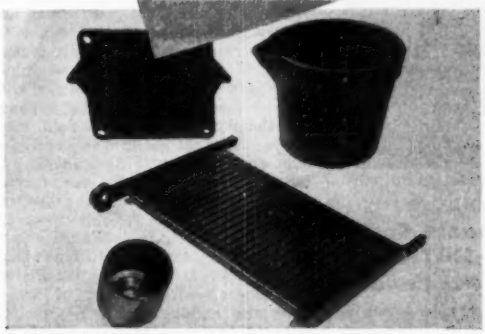
ASTM STANDARDS ON GLASS AND GLASS PRODUCTS, published by *American Society for Testing Materials*, 1916 Race Street, Philadelphia 3, Pa. Price $1.50. Presented in convenient form, this compilation contains 18 ASTM standard and tentative methods of test and specifications pertaining to glass. Included are methods covering chemical analysis of glass sand and soda-lime glass, and a standard procedure for flexure testing of glass. Besides the many methods, there are 425 definitions of terms relating to glass and glass products.

ONE GEAR BIT THE DUST, ONE DIDN'T

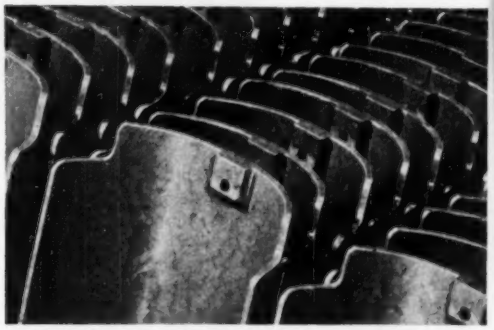
Abrasive dust makes short work of metal gear, has no effect on gear made of U. S. Rubber's new thermosetting plastic ENRUP



ENRUP GEAR (right) has operated for 9 months in grinding wheel finishing lathe. The metal gear (left) had to withdraw after 3 months' service because of damage by abrasive dust from grinding wheels. ENRUP's high abrasion resistance is seen at its best here.



FILTER PRESS PLATE, upper left, and chemical bucket, right, are molded from ENRUP replacing hard rubber because of toughness, heat and chemical resistance. Center is photostat separator plate, once made of hard rubber, now made of ENRUP because of superior toughness and high impact strength. Lower left is lap roll used in the textile industry. Once made of laminated phenolic, it is now molded out of ENRUP, cutting cost by 50%.



THESE COVERS for electroplating barrels were molded in one piece from ENRUP. Previous practice was to fabricate cover in sections from a thermoplastic material, then cement sections together. Molding cost has been cut more than 25 per cent. ENRUP can be punched, sawed, sanded, nailed, bolted, and machined. There is almost no end to its versatility.

ENRUP IS FABRICATED AND MOLDED ENTIRELY BY U. S. RUBBER ENGINEERS. Leading manufacturers select ENRUP to help make their products an outstanding success. ENRUP is about half the weight of aluminum, and is available in varying degrees of flexibility, ranging between that of elastic soft rubber on one hand, and hard rubber on the other. For more details on this remarkable plastic write to:

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UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

AIRBRIEFS

(*Continued from page* 54)

the British DeHavilland Comet, some for the Lockheed jet transport, and some for the Convair Turbo-liner, etc.

Helicopter-lifted Army

Whether it was the enlightening experien e of the war in Korea or an evolution long in the making, the Army Ground Forces are now definitely and completely sold on the helicopter as an essential piece of ground forces equipment. New Tables of Organization proposals are for one helicopter transport company in each division, the company to be made up of 23 helicopters plus pilots, crewmen, mechanics, supply personnel, etc. Army desires the 6-10 passenger transport type helicopter, rather than the two-man evacuation type pioneered in combat so brilliantly in Korea. Plans are for 23 helicopters in the existing 15 divisions and procurement plans for 350 of the big ships are already completed. All that is needed now is a helicopter that will do the job the Army wants and Sikorsky, Bell and Piasecki have just such models on hand. The helicopter revolution has been long in coming but it is now here in a military dress rather than the intercity civil guise always predicted.

Why British?

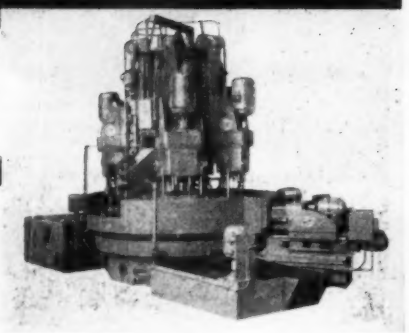
The decision of Curtiss-Wright Corp. to purchase the production license for the line of Armstrong-Siddeley gas turbine engines caught U. S. gas turbine engineers flat-footed and all those we have talked to have been baffled by the move, if not chagrinned. The arrangement was completed just at a time when the U. S. aircraft gas turbine industry was congratulating itself on not only closing the 10-year British leadership gap but actually surpassing them, not only in the turbojet field but in Britain's own specialty—the turboprop engine. U. S. gas turbine manufacturers now have available a line of turbojet and turboprop engines producing far, far greater power than their British counterparts and with comparable, if not superior, efficiency.

The final stunning blow came a few weeks later when Curtiss-Wright announced further acquisition of production rights to a gas turbine engine of the Bristol Aeroplane Co. Observers believe this latter engine is the as yet unannounced Bristol turbojet engine of some 9000 lb static thrust (the Allison J35-A-23 develops 9700 lb static thrust). Simultaneously, Curtiss - Wright revealed a line of eight gas turbine propellers, covering single and dual-rotation three- and four-bladed designs available for sub-, trans-, and supersonic speed applications. Coupled with the announcement that the company has abandoned the airplane field, these moves all signal the firm's intention to fight an all-out battle for leadership in the exclusively aircraft gas turbine power plant (engine plus propeller) field in the future. Some observers point out that Pratt & Whitney pole-vaulted into the gas turbine business by a similar deal with the British Rolls-Royce company, out of which came the highly successful Pratt & Whitney J42 and J48 turbojet engines already in quantity production. Curtiss-Wright obviously hopes to further pole-vault into the lead with developments of the Armstrong Siddeley and Bristol gas turbines. But with 10,000 horsepower turboprops and 10,000 lb thrust turbojets of native design and manufacture available in the U. S., the question still remains as to whether this move indicates U. S. admission of failure to the British or is a wise move reckoned to enhance U. S. performance in this field. The question will be answered within the coming year by procurement action on the part of the services and if Wright versions of these engines are ordered in quantity for military installation, much of

(*Turn to page* 120, *please*)

For High Production and Lower Unit Costs on Machine Tool Operations

...USE DAVIS&THOMPSON Roto-Matics



Here's a good example of the application of standard machine units to a special production job. Drilling and reaming operations of suspension support holes are performed on both right-hand and left-hand parts simultaneously. Drilling and reaming king pin holes is also included. Six stations, five operating and one loading, handle all operations with a total of 16 spindles. Machines of this type can be furnished from standard basic units for special applications on most all metalworking operations.

For Combined Operations or Single Purpose Machines

Machines similar to this can be designed to handle dissimilar operations in the same parts or one operation on continuous production. An indexing table with ROTO-MATIC POWER HEADS is easily arranged to suit special machining operations.

Lower Maintenance Costs with ROTO-MATIC Mechanical Power Heads

This machine is a good representative of the applications of D. & T. Roto-matic mechanical power heads. Six heads are used, three vertical and three horizontal. These new power heads lower maintenance costs through elimination of excessive servicing.

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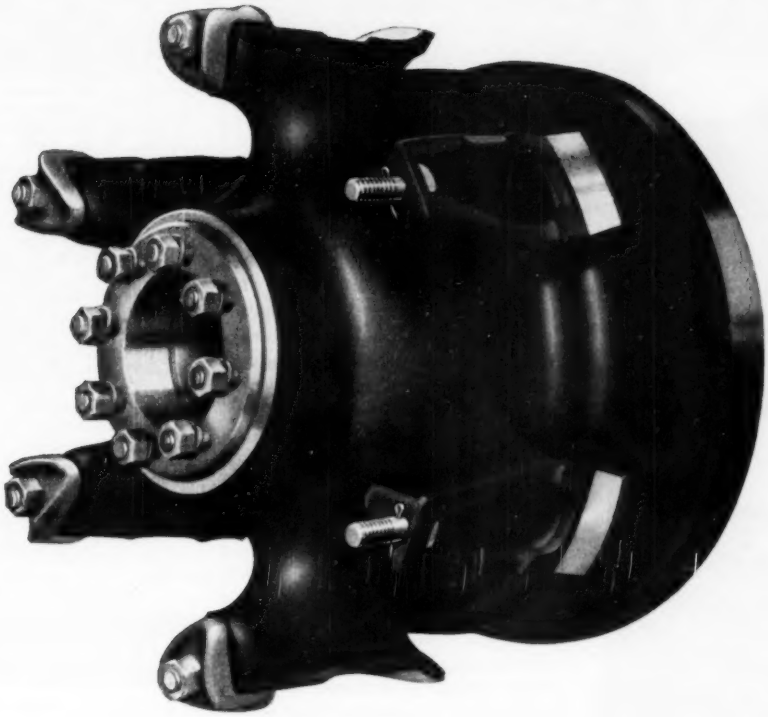

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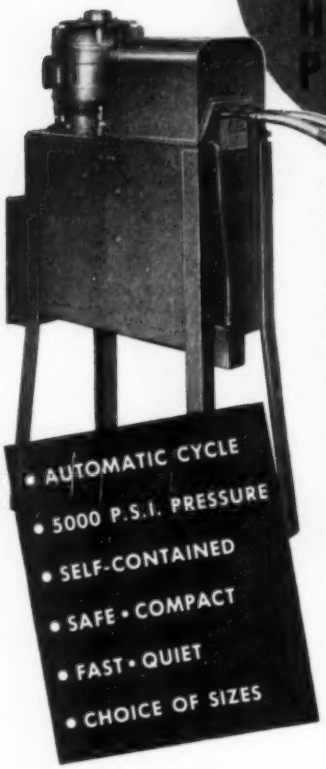
Use HANNIFIN'S "Packaged" HYDRAULIC POWER UNIT



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● Send for a copy of Bulletin 150. Illustrated with photographs and diagrams, this 28 page bulletin is filled with helpful information on modern production methods of riveting, punching, pressing, shearing, multiple punching, and multiple riveting. ASK FOR YOUR COPY.

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the background of the move will be obvious. But Allison, General Electric and Westinghouse will be heard from—and rightfully so—if such a move materializes.

French Contest

It appears from a clipping sent in by a friend the other day that the Paris newspaper "Ce Matin—Le Pays" has scored a brilliant, if explosive, "touche." The paper has created an Atlantic Challenge Cup to be awarded to the trans-Atlantic airline demonstrating the highest schedule reliability this winter. Observers of the paper will check—in great secrecy—an aircraft of PAA, TWA, Air France, Sabena, Swissair and SAS each week on one east-bound and one west-bound flight. Aircraft arriving behind schedule will be penalized and the highest score attained during the period Nov. 5 to Feb. 3, will be awarded the trophy. Trans-Atlantic schedules, although on the whole generally good, have turned in some atrocious performances in the past few years (an entire day late not being unusual). The airlines point to the complexity of the operation and the need for far greater safety precautions (such as delaying takeoff due to weather) in the over-water route as compared to domestic routes. Admitting all this, it is still a fact that these services have been offered for five years now and the time is fully at hand for the challenge to schedule reliability offered by the newspaper.

BOOKS ...

ILLUSTRATING FOR TOMORROW'S PRODUCTION, by *J. Harold Farmer, Abbott J. Hoecker,* and *Francis F. Vavris,* published by *The Macmillan Co.,* New York 11, N. Y. Price $5.00. Isometric and oblique drawings are explained in clear, simple terms as a necessary background for production illustrating. Each step in the instruction is illustrated, and there are many illustrations in two colors to make the mechanics of perspective and projection readily understandable. A special section explains aircraft illustrating.

GAS PRODUCERS AND BLAST FURNACES, by *Wilhelm Gumz,* published by *John Wiley & Sons,* New York 16, N. Y. Describing the methods for calculating the design of synthesis gas producers that have been found useful and reliable by German engineers, this book extends these methods to other types of industrial furnaces such as the iron blast furnace and the cupola furnace. Through the use of examples and a modest amount of higher mathematics, the author demonstrates the practical application of his methods in research and industry.

PROTECTIVE COATINGS FOR METALS, by *J. W. Gailer* and *E. J. Vaughan,* published by *Charles Griffin and Co., Ltd.,* 42 Drury Lane, London WC 2, England. Describing the most important of the various films or coatings which are applied for the protection of the more commonly used metals, this book clearly explains the theory of their action and specifies in detail the methods of application. Tables are provided that give the salient facts about each process.

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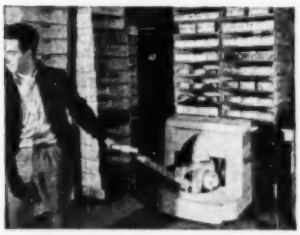
it's a YALE *WORKSAVER* electric truck



FOR NARROW AISLES

FOR FREIGHT CARS

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STUBBY OUTSIDE STURDY INSIDE!

Squeezing through narrow congested areas is a cinch for "Stubby." Here's why: "Stubby" is 6 inches shorter than other Worksaver models. But it's cut down in length only . . . all the efficient qualities standard in Yale Worksavers are part of "Stubby," too! "Stubby" Worksavers can be had in pallet or platform lengths to suit your exact needs . . . in 4,000 and 6,000 lb. capacities.

Only "Stubby" Worksavers have *all* these advantages:

1. ***Operational Controls On The Handle.*** Dual controls . . . right or left-hand operation for two forward and reverse speed travel. Push buttons for elevating and lowering . . . dual control warning signal.

2. ***Power-packed Drive Unit*** has improved motor efficiency.

3. ***"Dual-Lift" Mechanism*** . . . new . . . better. Combines 2 hydraulic lifting cylinders with articulating connection to lifting linkage.

4. ***Easy Steer*** . . . widely separated tapered roller load bearing and 16" diameter, ball bearing steering ring with built-in, self-aligning features. Greater than right angle turning in either direction.

5. ***Positive Acting Safety Brake*** effective instantly with handle in either upright or horizontal position.

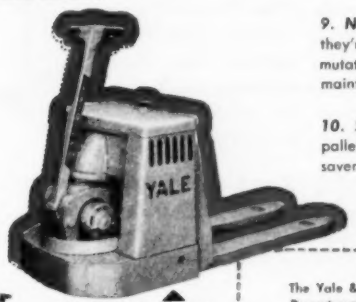
6. ***Dual Trailing Wheels*** in each fork of pallet truck provides wide floor contact . . . easier turning . . . greater floor protection.

7. ***Large Diameter Drive Wheel*** has more rubber . . . cleated treads for better traction and longer wear.

8. ***Double Battery Protection*** . . . batteries assembled in steel case . . . fit in Worksaver's totally enclosed heavy steel battery compartment.

9. ***No Flexing Of Electrical Wires*** . . . they're fed into handle controls from commutator at fulcrum point. Eliminates breakage, maintenance . . . reduces fire hazard.

10. ***Spark Enclosed Features*** available on pallet and platform type "Stubby" Worksavers.



"Stubby's" 6 inch shorter length comes in handy in tight spots.

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Please send me:

- ☐ Pallet Type "Stubby" Bulletin—P-1207
- ☐ Platform Type "Stubby" Bulletin—P-1206
- ☐ The name of the nearby Yale representative

Name.....

Company.....

Address.....

City and Zone.....State.....

M-19

Paris Automobile Show

(*Continued from page 45*)

Veritas Meteor produces sports models only. There is one type of chassis, modified according to whether it is intended for normal service or sports events, with a six cyl valve-in-head engine of 2.95 by 2.95 in., developing either 100 or 140 hp. Fore and aft torsion bars are used at the front and coil springs at the rear. A small car with a Panhard flat turn also is built by Veritas Meteor.

American participation in this year's show was strong, the passenger car makers comprising Buick, Cadillac, Chevrolet, Chrysler, De Soto, Dodge, Hudson, Kaiser-Frazer, Nash, Oldsmobile, Packard, Plymouth, Pontiac, Studebaker and Willys-Overland. In addition to these were Herwaythorn, with imported Thornton Tandem and Thornton Eaton units fitted to European vehicles, Marmon Herrington, White, Cummins, Buda engines; and Hercules engines built under license by Hispano-Suiza.

Comparatively little novelty was found in the truck and coach section of the show. Renault, who last year introduced an underfloor coach of unit construction, showed a series of trucks and tractors with horizontally mounted Diesel engines. One of these hauls a stainless steel semi-trailer van having a capacity of 1420 cu ft. Scemia, closely affiliated with Renault, also had an underfloor Diesel in a bus chassis.

Transverse rear engine mounting was represented by Alfa Romeo with a 36 passenger Tubocar coach, and Isobloc was on the same general lines of construction.

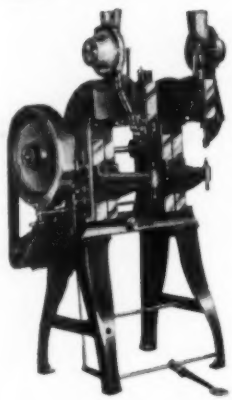
A Paris bus chassis, to receive a single deck body, was shown by Somua. This featured a forward mounted Panhard six-cyl Diesel, with Lanova head, of 140 hp, a fluid flywheel, and Wilson planetary transmission with hydraulically assisted change. This same general layout has been adopted by a large number of London buses.

Chausson, the biggest coach producer in France, had unit construction under Budd license, with a choice of various types of engines and a rather wide range of body types. Another unit construction, shown by Vernet, had the flat floor only 17 in. from the ground. This low loading platform is obtained largely by a differential housing suspended on the chassis and reduction gear from the differential shafts to the road wheel shafts. The rear wheels are independently sprung by a system of longitudinal leaf springs and rubber blocks placed at the extremities of the leaves. Panhard has a 6 x 6 with Thornton tandem; Fruehauf trailers were shown built under license in France, and Ford presented a 10 ton tractor with a Hercules Diesel engine and Eaton two-speed axle.

Spain appeared for the first time as an automobile manufacturing nation with an outstanding truck and coach chassis designed by engineer Ricart for the Spanish National Automobile Co., at Barcelona, and designated the Pegaso. These vehicles have been designed to meet driving conditions in Spain, and are now being produced almost completely at the Barcelona factory by 3000 employes. The engine is a six cyl, 125 hp Diesel of 4.53 by 5.91 in. bore and stroke, the cylinders and crankcase being a one-piece casting of heat-treated light alloy, with two detachable light-alloy heads and detachable nitrided liners. Valves are mounted vertically in the head, with push-rod and rocker operation. Weight of the chasis, with driving cab, on a 149-in. wheelbase, is 12,166 lb.

Using the same engine, Pegaso has a 36-passenger deck-and-a-half coach of frameless design. All the lower portion of the body is a one-piece welded steel construction. Front wheels are independently sprung by bunched square section torsion bars. The upper portion of the body, that is the roof over the main passenger compartment, is of light alloy.

WHATEVER YOU FASTEN . . .
COMPOSITION TO COMPOSITION
FABRIC TO FABRIC
WOOD TO WOOD
METAL TO METAL
LEATHER TO LEATHER
OR ANY COMBINATION OF THESE MATERIALS . . .
Chicago AUTOMATIC RIVETING
FASTENS IT RIGHT . . . AND FASTENS IT FAST



1/3 Chicago Automatic Rivet Setters from 1 to 4 tubular or split rivets are fed, inserted and clinched in a fraction of a second with each operating pedal release. Adjustment on some models permits handling different sizes of rivets. Riveting machine also adaptable for eyelets, grommets or drive screws.

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Set New Standards for High Production and Low Cost

Making news in the welding field is an old story at Mallory . . . where new and practical ideas are the result of extensive research in resistance welding alloys, tips, holders and dies.

Mallory cold bent offset tips with the cooling tube bent in place bring the cooling water directly to the welding area. This exclusive Mallory feature has established new records in offset tip life.

Mallory fluted tips give 70% more cooling area. These cooler-operating Mallory fluted tips are establishing new low cost-per-weld records in every application.

Now you can have the ultimate in your welders . . . a combination of fluted water holes in bent offset tips . . . and you can have them through Mallory and Mallory alone. They bring you startling new production records at no increase in cost.

That's value beyond expectation!

Mallory's resistance welding know-how is at your disposal. What Mallory has done for others can be done for you!

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REASONS WHY MALLORY FLUTED TIPS ARE SETTING WELDING RECORDS

- 70% increase in cooling area.
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- Reduced mushrooming.
- Less frequent dressing.
- More rigidity.

Available in all types of tips with #1, #2, and #3 Morse tapers.

Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings

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ASM Meetings

(*Continued from page* 39)

telle Memorial Institute.

There were about 70 papers presented at the 16 sessions of the American Welding Society. Many of the sessions were devoted to specific industries such as aircraft, machinery, railroads, piping, and ship structure. Others covered the newest developments in such processes as resistance welding, inert gas shielded arc welding, automatic welding, and gas cutting. A third group was devoted to general fields such as surfacing, controls, arcs and electrodes, research, and education. In addition, three symposiums were presented. One showed the economies resulting from good welding design, another was on the subject of applied welding engineering, and a third discussed the needs of industry in the field of resistance welding.

At a special session, the 1950 Lincoln Gold Medal was awarded to Howard S. Avery, American Brake Shoe Company. Charles H. Jennings, Westinghouse Electric Corp. was selected as the 1950 Adams Lecturer. The Samuel Wylie Millar Medal went to Dr. Wendell F. Hess of the Rensselaer Polytechnic Institute. Winners of the 1950 Resistance Welder Mfrs. Assn. $2000 prize contest were announced with first prize going to J. W. Kehoe, Westinghouse Electric Corp.

Harry W. Pierce, New York Shipbuilding Corp., is the new president of the AWS for 1950-51. C. H. Jennings, Westinghouse Electric Corp., is first vice president, and F. L. Plummer, Hammond Iron Works is second vice president.

Some of the general subjects covered at the sessions of the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers, were plastic deformation, recrystallization and annealing textures, structure of alloys, transformations, properties of alloys, and powder metallurgy.

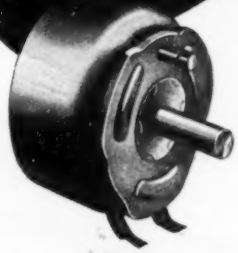
Ultrasonics, magnetic-particle testing, fluoroscopic inspection, and radioisotopes were subjects discussed during the technical sessions of the Society for Non-Destructive Testing. W. E. Thomas, vice president, Magnaflux Corp., was elected president of the Society for 1950-51. Noah A. Kahn, New York Naval Shipyard, was elected vice president, and Robert C. McMaster, Battelle Memorial Institute, treasurer. Philip D. Johnson was re-elected secretary.

Following are abstracts of several of the papers presented at the technical sessions of the American Society for Metals.

(*Turn to page* 126, *please*)

LEDEX

ROTARY SOLENOID



SOLVES MANY REMOTE CONTROL PROBLEMS

The many production applications of Ledex Rotary Solenoids vary from the dependable, snap-action tripping of airborne bomb releases to the actuation of rugged, hydraulic valves in heavy duty materials handling equipment.

Five Ledex Rotary Solenoid models are manufactured. Diameters range from 1⅛ to 3⅜ inches. Predetermined rotation up to 95° can be engineered to suit your product's requirements. Starting torques for 45° stroke range from ¼ pound-inches to 50 pound-inches.

We supply to quantity users and solicit the opportunity to be of assistance in engineering a Ledex Rotary Solenoid to meet your product's requirements.

MODEL NO.	2	5	6	7	8
Diameter	1⅛"	1⅛"	2¼"	2¾"	3⅜"
Torque lb./inches	¼	5	10	25	50
Weight lbs.	¼	½	1	2¼	4¼

Magnetic action moves the armature along the solenoid axis. This action is converted into a rotary motion by means of ball bearings on inclined races.

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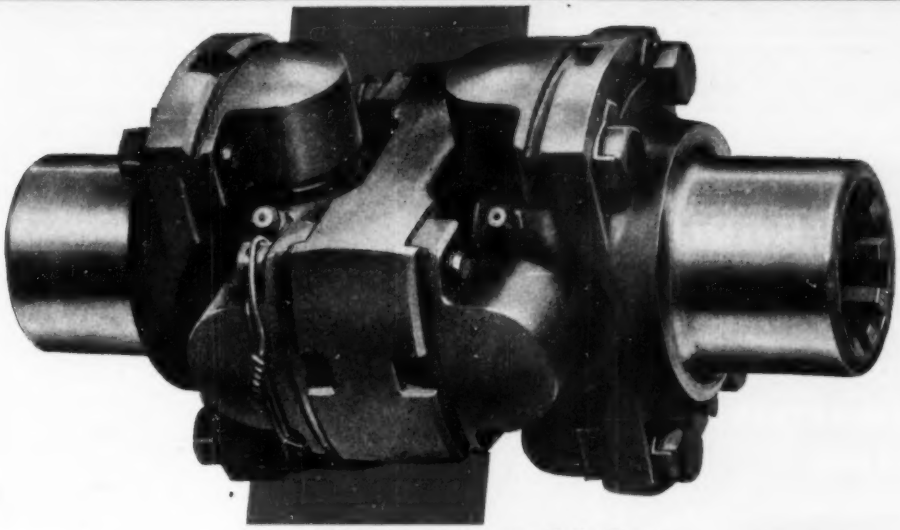
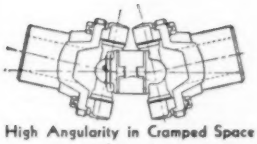
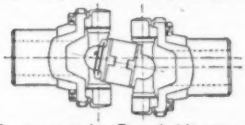




High Angularity in Cramped Space



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For Cars • Trucks • Busses and Industrial Equipment

ASM Meetings

(*Continued from page* 124)

Grindability of Tool Steels

By L. P. Tarasov
Norton Co.

ALTHOUGH the term machinability can be used to denote the relative ease of removing material by any machining method, including grinding, certain distinctive features of the grinding process make it highly desirable to use a separate word, grindability, to describe that portion of machinability which has to do with grinding.

Grindability of tool and die steels, and presumably of other heat treatable varieties, can be expressed conveniently and usefully in terms of a dimensionless index which equals the volume ratio of the material removed to wheel wear. The numerical value of the index depends primarily on the grinding wheel used, since a soft one will wear more rapidly than a hard one, but it can also be affected by other variations in grinding conditions. An increase in the index for a given set of grinding conditions corresponds to an improvement in the grindability.

Grinding energy per unit material removed does not agree with shop expeience in rating many of the tool steels from the standpoint of ease of grinding and thus is not, by itself, a useful measure of grindability. However, when it is plotted against the grindability index defined above, the resulting grindability curve is very helpful in deciding how the various steels should be grouped with respect to grindability and in studying the factors affecting it, see Fig. 1 (see page 38). Table I gives the descriptions of the steels investigated.

Table I

Description of Steels Investigated

Steel Designation	Type of Steel Description		ASM Type*
	High Speed Steels		
AA_1	18-4-1	(T1)	5C1
AA_2	18-4-1	(T1)	5C1
AB	18-4-2	(T2)	5C2
ABA	20-4-2, 12 Co	(T6)	5D4
AC	18-4-3	(T3)	5C3
AD	18-4-4	—	—
BB	14-4-2	(T7)	—
BC	14-4-3	—	—
BEA	13-5-5, 5 Co	(T15)	—
CA	2-9-1	(M1)	5A2
CB	8-8-2	(M10)	5A1
DAB	6-5-4-1, 1 Cb	(M8)	—
DB-1	6-5-4-2	(M2)	5A3
DB-2	6-5-4-2	—	—
DC	6-6-4-3	(M3)	—
DD	6-5-5-4	(M4)	5A4
	Miscellaneous Tool Steels		
EA	Plain carbon		1A
EB	Nondeforming, oil hardening, low alloy		2A2
EC	Nickel-chromium		6E
ED	Nondeforming, air hardening, low alloy		2B1
EE	Shock resisting		3B
EF	Hot work		4B
EG	Nondeforming, air hardening, medium alloy		2B2
EH	Hot work		4F1
EJ	Finishing		6K
	High C, High Cr Die Steels		
FA_1	Oil hardening		2C1
FA_2	Oil hardening		2C1
FB	Air hardening		2D2
FC	Air hardening, high vanadium		—
	Graphitic Tool Steels		
GA	Nondeforming, oil hardening		—
GB	Water hardening (shallow)		—
GC	Air hardening		—
GD	Water hardening (medium)		—
	AISI Steels		
HA	52100		—

* ASM Metals Handbook, 1948, p. 656.

Table I gives the descriptions of the steels investigated.

The grindability index of nondeforming steels decreases rapidly with increasing chromium content and that of high speed steels with increasing vanadium content. Molybdenum, cobalt and columbium do not appear to have any definite effect on the grindability of high speed steels, at least within the scatter of the results. In five per cent chromium steels, an increase in carbon content lowers the index. These effects can be readily explained in terms of carbide particle hardness. Vanadium carbide particles in a high vanadium, high speed steel are much harder than the complex iron-chromium carbide par-

(*Turn to page* 128, *please*)

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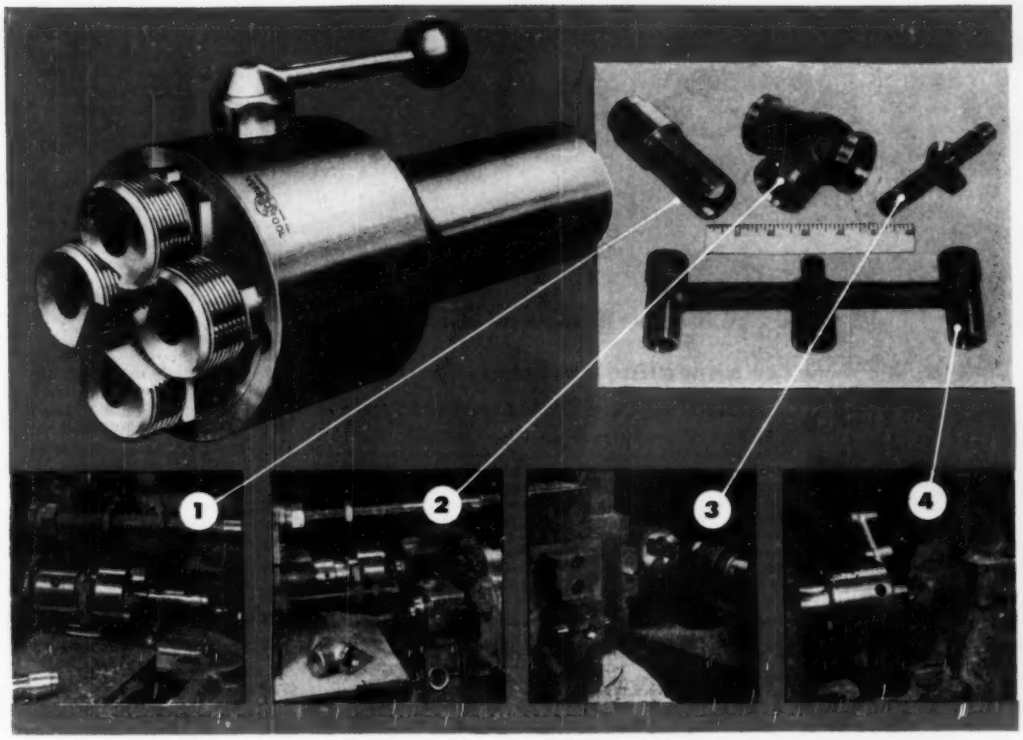
HEAT TRANSFER PRODUCTS DIVISION BELOIT, WISCONSIN



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for the tops in dollar performance—in threading production

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Each of these pluses is directly traceable to the exclusive basic design features of the Namco Vers-O-Tool, including:

CIRCULAR CHASERS—regrindable through a full 270°, for 10 to 50 times longer life.

INTERCHANGEABILITY of chasers, size for size, on all three types of Namco Vers-O-Tool heads keeps tool inventory at an economical minimum.

ACCURACY of thread form, throughout the life of the circular chaser, is assured by exclusive direct micrometer check after each regrind. With Vers-O-Tools you can count on precision threads and smooth finish.

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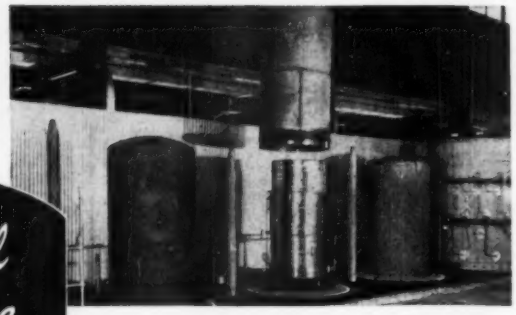

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ticles in a high carbon, high chromium steel and these in turn are much harder than the cementite particles in carbon tool steel. The grindability index increases very rapidly in the same order. Steels cannot be rated for grindability on the basis of the quenching medium customarily employed.

A decrease in the Rockwell hardness of a steel by tempering generally improves its grindability. Improvement is greatest for the low grindability steels.

An increase in the grindability index may correspond either to an improvement or deterioration in the surface finish obtained. Under the surface grinding conditions used, in which the wheel was dressed sharp for fast stock removal, the medium grindability steels had a poorer finish than either the low or the high grindability steels. For the same steel, a decrease in Rockwell hardness generally leads to a rougher surface.

There is no relationship between the grindability of a steel and the extent to which it is burned under sufficiently severe grinding conditions, nor between grindability and grinding sensitivity.

A Hardenability Test for Deep Hardening Steels

By William Wilson, Jr.
Armour Research Foundation

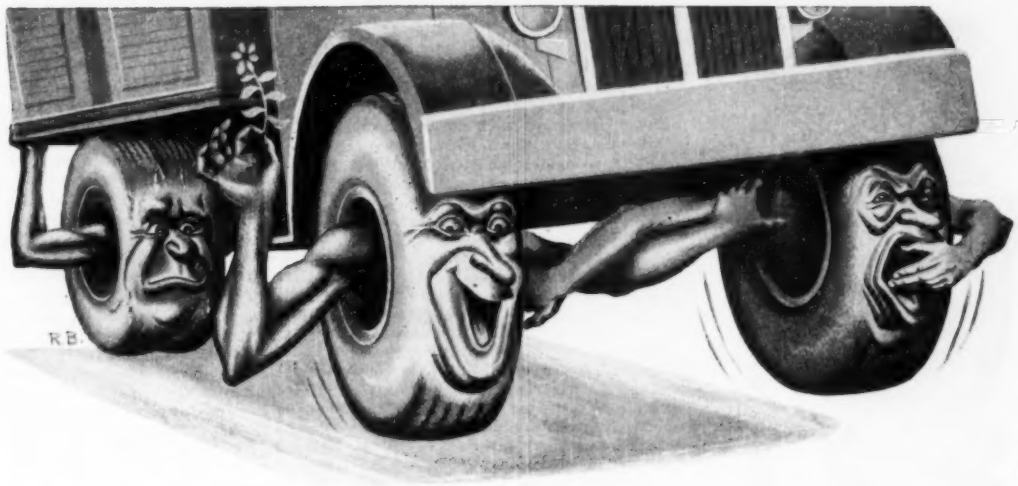
IN view of the clarification of hardenability by the Jominy test, it was believed desirable to extend this type of testing to include the deep hardening grades of steel. It is well known that some steels harden throughout larger sections than those to which the Jominy test is equivalent.

A literature survey showed that the need was for a test that: (a) made possible the study of deep hardening steels; (b) provided cooling curves satisfying the proposed criterion of equivalent cooling conditions; (c) was reproducible; and (d) included the Jominy test range for comparative purposes. No simple analytical approach to this problem was available. It was a problem of elimination by trial and error to secure a set of testing conditions which would meet these specifications.

The test specimen is 1¼ in. in diam by 11 in. long. This specimen is machined from 1½-in. round stock allowing ⅜ in. of stock removal to eliminate any prior decarburization. Each specimen is provided with seven thermocouple wells; these are drilled radially through the center of the bar and to a depth of 1/16 in. from the opposite side of the bar. The specimen is provided at its top with an extension rod for supporting it in the quenching fixture. These constructional details for the specimen are shown in Fig. 2. (Pg. 130)

Water at room temperature is used to quench one end of the hardenability bar and is directed vertically from a ½-in. diam jet orifice with a velocity

(*Turn to page* 130, *please*)



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Front axles, too, should carry their full share of the load—the share that means extra tonnage . . . extra truck-owner satisfaction.

Saginaw's new hydraulic power steering gear permits truck manufacturers to design vehicles that will carry up to *double* the usual payload on the front wheels—without exceeding legal load limits.

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corresponding to a free jet height of 3½ in.

A Hevi-Duty Electric Co. furnace type M-2011 S was remodeled for this testing. A 1¼-in.-thick outer lining of 2000 F refractory brick is used. Inside this refractory liner, hairpin cooling coils of ¼-in. stainless steel tubing are used. These cooling coils are of varying lengths and are connected in series. An inner lining of 2300 F refractory brick is used between the cooling coils and the original refractory heating element retainers. The original heating elements, consisting of three pairs of elements, are used. Each pair is externally controlled by a variable transformer. A stainless steel equalizer tube is used immediately inside the heating elements. In the right-hand side of the furnace, the hardenability bar is supported in its heating position; the seven thermocouples are inserted in the bar and extend through the top of the furnace. The specimen is supported inside the equalizer tube.

In preparation for the heating cycle, a thick transite plate, with a small recessed heating element, is inserted between the bottom of the furnace and its supporting ring. With the specimen in place, and with all thermocouples connected to a multiple-point recorder, heating is started by controlling the voltage applied to the various sections

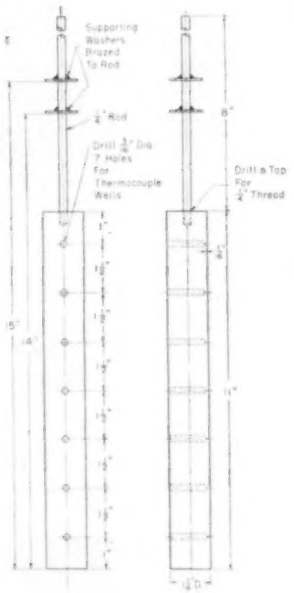

Fig. 2—Specimen for the new hardenability test.

of the furnace and to the small heating element in the plate. The latter heating element serves to make up end losses from the furnace. During the development stages of this test, the complete heating cycle was manually controlled with variable transformers. Recently, the furnace has been connected to operate on two pyrometers. The lower nine-in. length of the hardenability bar, with manual control, could be maintained within ± 10 F of the desired austenitizing temperature. The uppermost two-in. length of the specimen is to be disregarded, because over this length there is a drop in the austenitizing temperature. Normal operation includes holding the bar at the austenitizing temperature for one hr.

In preparation for quenching, the inserted transite plate is withdrawn, allowing the equalizer tube to rest on the steel pins in the annular transite support. The hardenability bar is lowered to its quenching position; voltage applied to the two lower pairs of heating elements is reduced to zero. At this time, three simultaneous operations are performed, the pump or jet is started, water is admitted to the cooling coils, and the recorder chart is marked. Voltage applied to the top pair of heating elements is reduced. Total quenching time is 90 min, after which time the bar may be left in the furnace

(*Turn to page* 132, *please*)

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4. **Aluminum is non-corrosive, does not oxidize, therefore does not need protection.**
5. **A Permite aluminum casting is light in weight, yet has excellent strength factors and can easily withstand the stress placed upon it, in its use, attached to the engine of an automobile."**

This Purolator Oil Filter — with Permite cast aluminum body — is a special full flow type used as original equipment on one of America's finest automobiles.

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without experiencing any reheating.

Four longitudinal flats are ground at 90-deg intervals, removing 0.030 in. per flat. A preliminary Rockwell C hardness survey is made at ⅛ in. intervals. In intervals where an abrupt change of hardness is noted, readings are taken at smaller intervals.

The Tempering of Chromium Steels

By R. W. Balluffi, Morris Cohen and B. L. Averbach

THE kinetics of the first and second stages of tempering have been analyzed quantitatively elsewhere by means of precision-length measurements to trace the course of the reactions. Accordingly, the present work was concentrated on the third and fourth stages, although the second stage had to receive considerable attention in order to disentangle the third stage. Because of the large volume changes attending these processes, it was possible to follow the corresponding length variations with a dilatometer, which is a much less tedious approach than the precision-length technique. In addition, the conversion of the transition precipitate into cementite during the third stage was studied by means of magnetic measurements. This was feasible because the intensity of magnetization and the Curie point of the transition precipitate are both markedly higher than those of the cementite.

Retained austenite decomposes during the second stage of tempering into the same products as does the primary austenite on direct isothermal transformation. When the chromium content is sufficiently high so that a well-defined bainite C-curve appears in the primary transformation diagram, the retained austenite decomposition also exhibits a C-curve behavior.

Formation of cementite during the third stage of tempering has been traced by Curie point measurements. The indications are that the cementite, when first formed, is richer in iron than the formula Fe_3C, but gradually approaches this composition as the tempering proceeds.

Fourth stage of tempering occurs above 1000 F with the precipitation of $(Cr,Fe)_7C_3$ and the simultaneous solution of the cementite produced during the third stage.

Kinetics of the above reactions were analyzed, and heats of activation were determined. Modified nucleation and growth equations were found to fit the transformation curves for the second and third stages, but not the fourth stage.

Chromium retards softening during tempering because it inhibits the growth of the cementite particles in the third stage. The alloy carbide precipitates above 1000 F in a relatively coarse spheroidal form (compared to the existing fine dispersion of plate-like cementite), and is therefore attended by softening.

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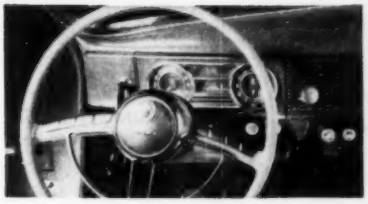

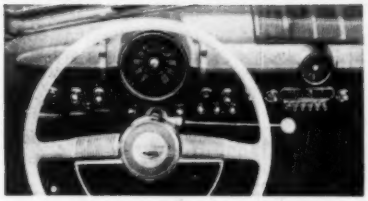

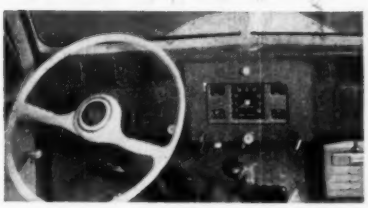

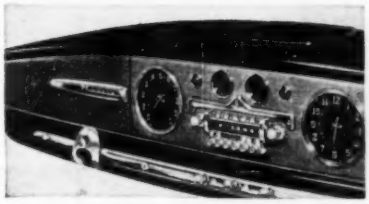

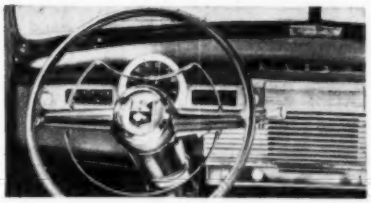

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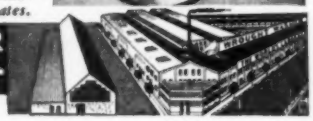

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Keller to Head Program for Guided Missiles

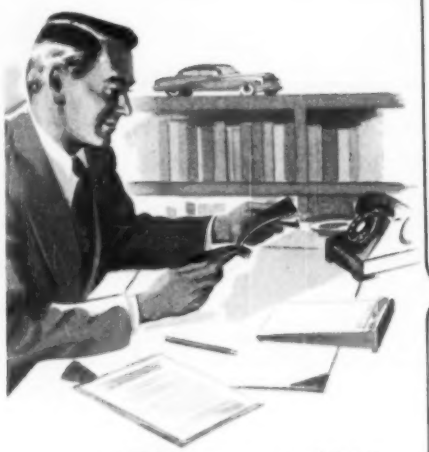
K. T. Keller, chairman, Chrysler Corp., has been named chairman of guided missiles for the armed forces. He will serve as a special adviser to Defense Secretary George Marshall on a part-time basis with no compensation for time and expenses. A company spokesman said Mr. Keller will not sever his connection with Chrysler.

Chrysler Automatic Drive Sales Hit 97 Per Cent

Chrysler Div. of Chrysler Corp. reports that more than 97 per cent of its cars built this year have been equipped with the Prestomatic fluid drive transmission. The Chrysler automatic drive consists of three basic units: fluid drive, safety clutch and a transmission in which gears are shifted automatically through hydraulic controls.

Dodge Names Gostow Forge Shop Head

Alfred L. Gostow has been named plant manager of the Dodge Forge plant to succeed Grover Eads who retired Oct. 31. Mr. Gostow has been with Chrysler since May, 1942, when he became general superintendent of the Forge Div. in the Dodge Chicago plant.



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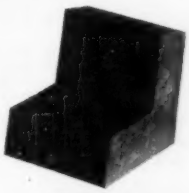

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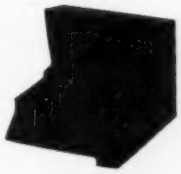

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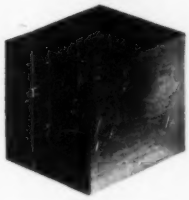

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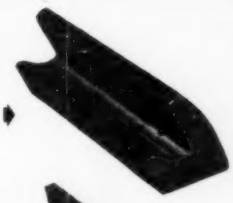

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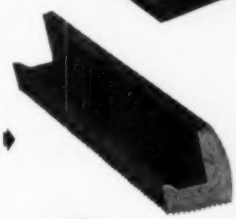

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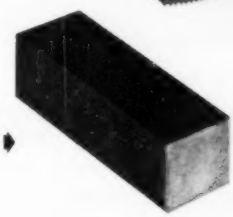

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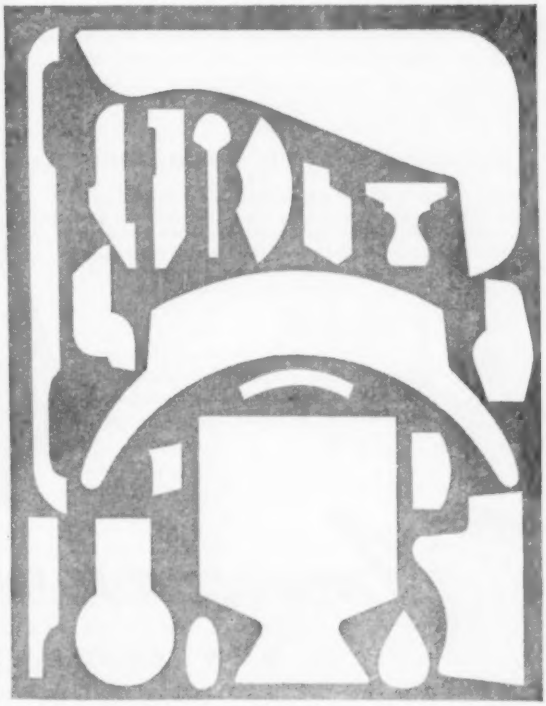

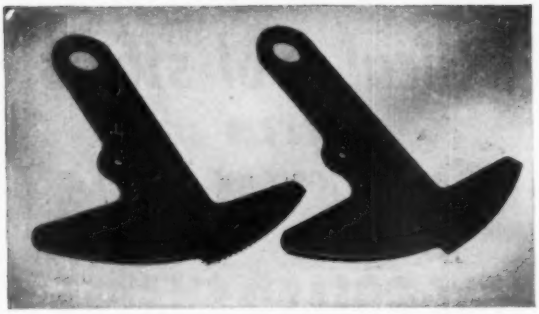

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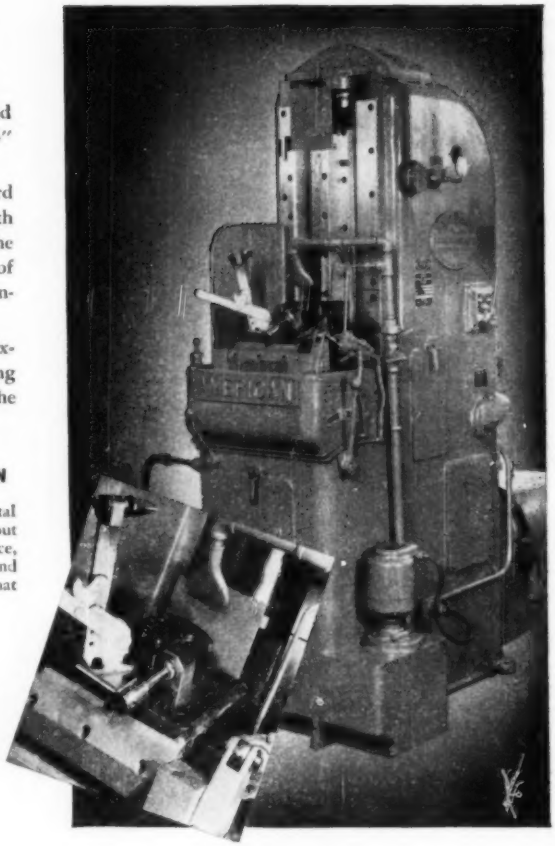

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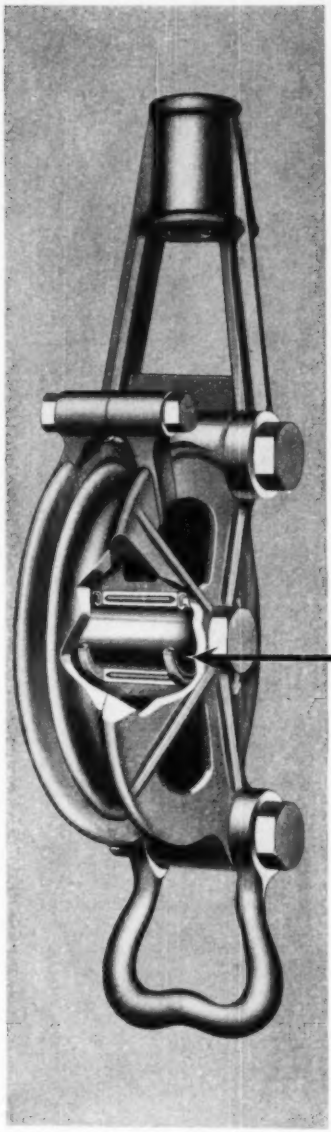

Fig. 1. Dump block application courtesy Hendrix Mfg. Co.

New, 1/8th" thick oil seal facilitates use of needle bearings in heavy dump block assembly

In the dump block of mammoth dragline buckets, needle bearings offer the ideal solution to the bearing problem. But protection of these friction-free bearings is complicated by extreme external abrasive conditions. Dump blocks are continually hauled through loose mud, dust or grit. Caking outside the dump block assembly is severe.

In the typical dump block application (Fig. 1), two National Syntech* Oil Seals solved the protection problem.

The seals were National 340,000 type (Fig. 2), consisting of a steel inner case completely covered and bonded to a synthetic rubber sealing member. These seals, of springless, single-wipe design, press fit into a 2" housing bore, and mount on a $1\frac{7}{16}$" shaft.

Besides effectively excluding foreign abrasive material from dump block bearings, this combination of two National Syntech oil seals and the needle bearings provided benefits not found with the metal bushings previously used. The entire bearing housing can now be readily cleaned merely by forcing grease through the assembly. Since sealing lips face outward, grease under pressure can escape. But when the pressure head is removed, tension of sealing lips retains protective lubricant around the bearings. This simple method of grease flushing also means that no disassembly of the dump block is required.

In many cases, manufacturers scheduling moderate-quantity production runs can realize sizable savings by using stock oil seal designs. National Oil Seals are available in thousands of stock sizes and shapes, and tools and dies for many thousands more are maintained. Perhaps a stock National seal will solve your problems. In any case, National Oil Seal engineers can apply the experience of over a quarter-century of oil and fluid sealing to your problem.

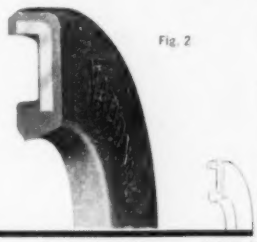

Fig. 2

Two National type 340,000 springless seals with sealing lips facing out

Section shown three times actual size

Actual size of seal section

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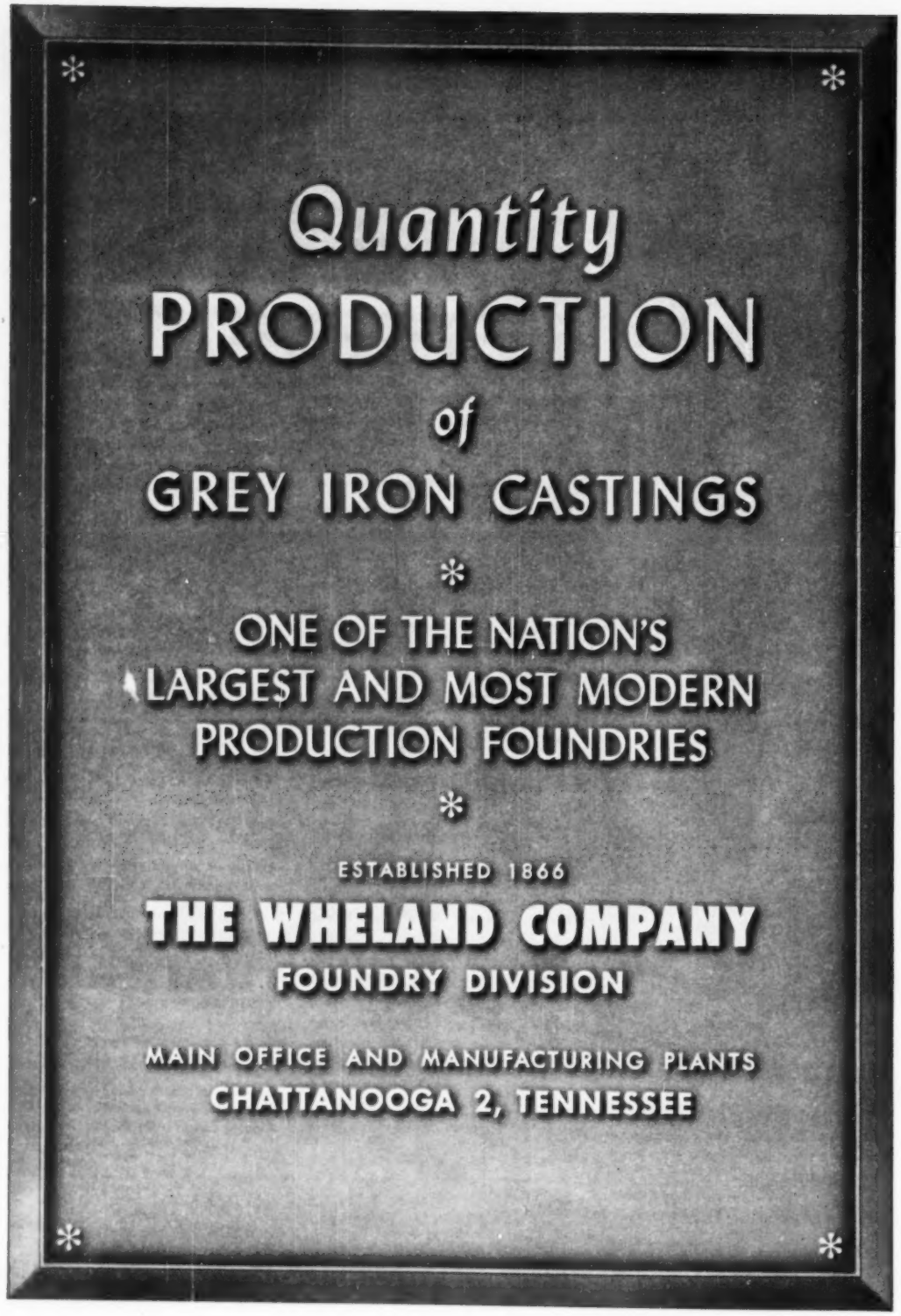
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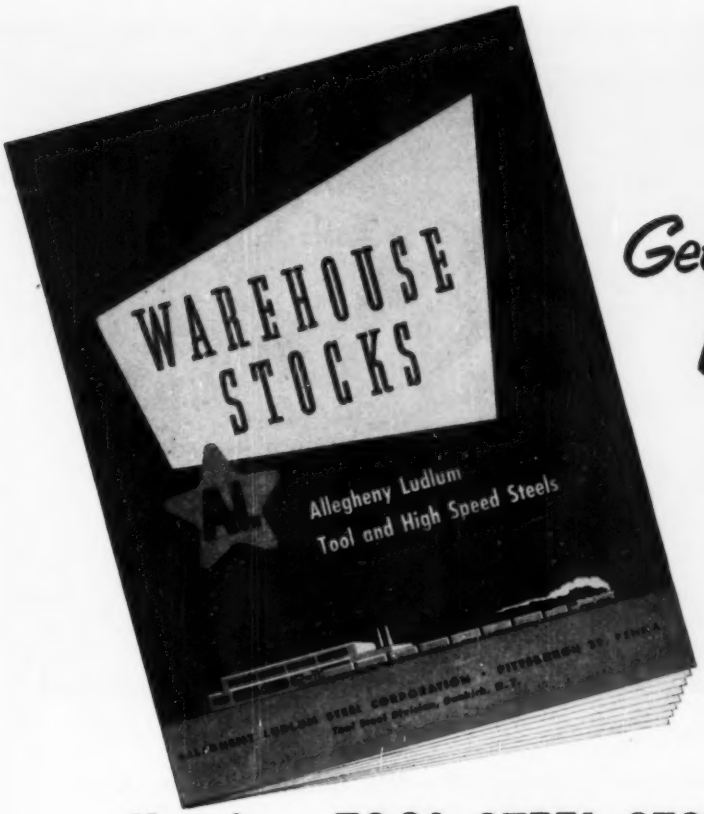

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The Allegheny Ludlum Tool Steel family includes 37 principal types, covering the high speed, hot work, shock resisting, cold die, and carbon and low alloy steel fields. Let us help you find the best answer to *any* problem that occurs in your production or use of cutting and forming tools.

ADDRESS DEPT. AI-11

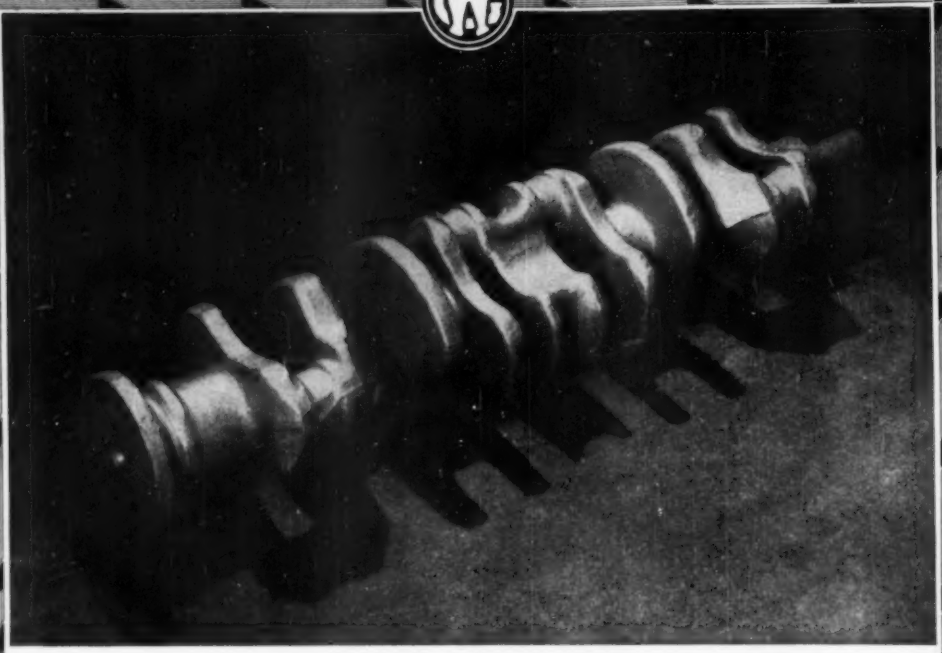
This 72-page catalog lists the stocks of A-L High Speed and Tool Steels which are constantly maintained in each of 18 warehouses, located at convenient points from coast to coast. In compact, easy-to-follow style, the book gives a complete stock picture, nationwide, of the 15 most widely used types of these steels—each in a full range of standard shapes and sizes—and also includes data on stocks of drill rod, tool bits and Carmet carbide metal blanks and tools.

It may be that your requirements call for mill shipments. If so, you can rely on us to schedule material for you without delay. *But*—if you depend entirely or in part upon ordering High Speed and Tool Steels in smaller lots—and want to know where you can get them *quickly*—you'll find A-L's book of "Warehouse Stocks" mighty handy to have in your desk. • Write for your copy *today!*

ALLEGHENY LUDLUM
STEEL CORPORATION
Pittsburgh, Pa.

TOOL STEEL DIVISION: DUNKIRK, N. Y.

Fine Tool Steels Since 1854 AL W&D 3139



Fully counterbalanced crankshaft—the ultimate in modern forging technique . . . Wyman-Gordon . . . crankshaft forging specialists since the introduction of the internal combustion engine . . . first to forge crankshafts with integrally forged counterweights . . . . . .

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Forgings of Aluminum, Magnesium, Steel

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CADILLAC OWNER: "I use New Blue Sunoco exclusively. It's by far the best high-test gasoline for the money, and I find it gives me smoother power than any other gasoline I've ever tried." MRS. WILLIAM TAYLOR

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ALL CARS: "In top-notch motor tune-ups, the gasoline used is of prime importance. That's why, after a motor tune-up job, we recommend New Blue Sunoco to all our customers." GEO. A. ROBINSON III, *Delray Ignition Service*

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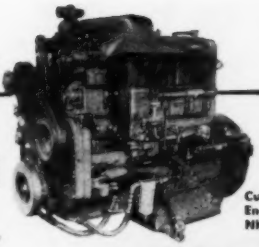
Demonstrate your cars on New BLUE SUNOCO to show their performance at its best. Recommend New BLUE SUNOCO to new car purchasers. They'll appreciate your performance-giving, money-saving suggestions.

At Cummins Engine Company

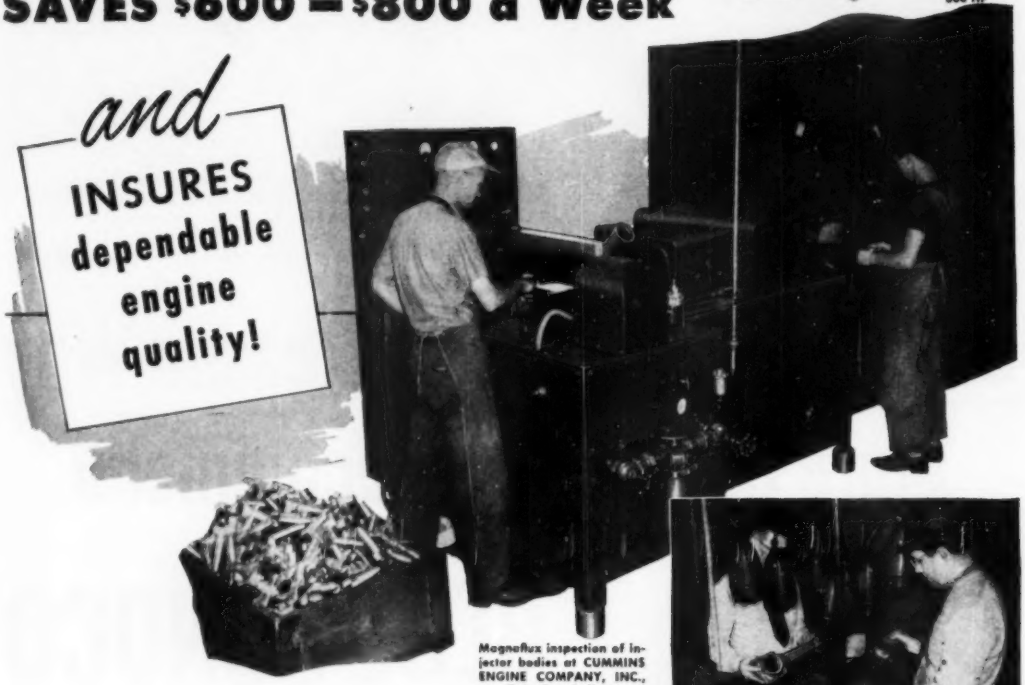


Cummins Diesel Engine — Model NHRBS — 600 — 300 HP

MAGNAFLUX* INSPECTION SAVES $600 — $800 a Week

and

INSURES dependable engine quality!



Magnaflux inspection of injector bodies at CUMMINS ENGINE COMPANY, INC., Columbus, Indiana

Inspecting rough forged connecting rods for Magnaglo fluorescent indications under black light.

Cummins Engine Company Diesels are recognized for dependable service in the field. This they insure in manufacture by fully effective Magnaflux-Magnaglo* inspection of critical parts.

By using Magnaglo to detect defective forgings and castings *in the rough*, Cummins Engine Company eliminates useless finishing operations. Direct savings in machining time, equipment and labor are currently averaging $600 to $800 a week—with production capacity increased in similar ratio.

Forgings and castings to be inspected are hand-loaded onto the Magnaflux unit's endless conveyor and automatically processed with Magnaglo. At the inspection station pertinent defects are indicated under the black light by glowing fluorescent lines. Depending upon the kind of parts in process, up to 1200 pieces per hour can be inspected.

Cummins' operation may not be typical of your problem but Magnaflux has solutions for most industries. Invite an experienced Magnaflux engineer to discuss them with you.

Reg. U. S. Pat. Off.

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5904 Northwest Highway, Chicago 31, Illinois

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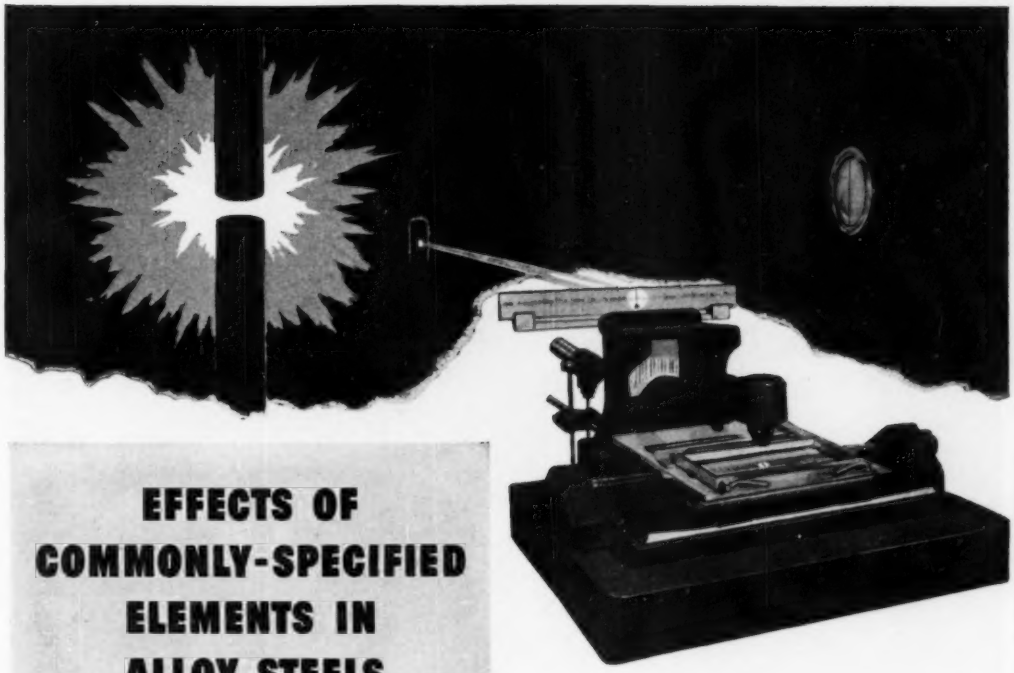


EFFECTS OF COMMONLY-SPECIFIED ELEMENTS IN ALLOY STEELS

The effect of a combination of alloying elements on the properties of an alloy steel is considerably greater than the sum of the effects of these elements if used separately. This inter-relation must be taken into account whenever a change in a specified analysis or composition is evaluated. To simplify the subject we have outlined below some of the individual effects of four of the leading elements used in alloy steels.

NICKEL – One of the fundamental alloying elements, nickel provides steel with such advantages as improved toughness at low temperatures, low distortion in quenching, good resistance to corrosion, and ready response to economical methods of heat-treating. Nickel steels are suitable for case hardening and have excellent resistance to impact, wear and fatigue.

CHROMIUM is an element used primarily to increase the depth-hardenability of steel. It also promotes carburization and improves resistance to abrasion and wear. Used in quantities of over 4.00 pct, it adds considerably to corrosion-resistance. High-chromium steels have relatively good air-hardening properties.

MOLYBDENUM – This element, which does not readily oxidize, provides a large measure of hardenability to steel and is particularly useful where close control of hardenability is required. It greatly increases the high-temperature strength as well as the creep strength. It also provides resistance to many forms of corrosion, and reduces temper brittleness.

VANADIUM is an element used to refine the grain and improve the mechanical-property balance in steels. It is also used to develop the general properties in many alloy grades.

Our metallurgists can be of considerable help to you in selecting the most economical grades of alloy steel for any application. These men will gladly give unbiased advice concerning alloy-steel composition, heat-treatment and machinability.

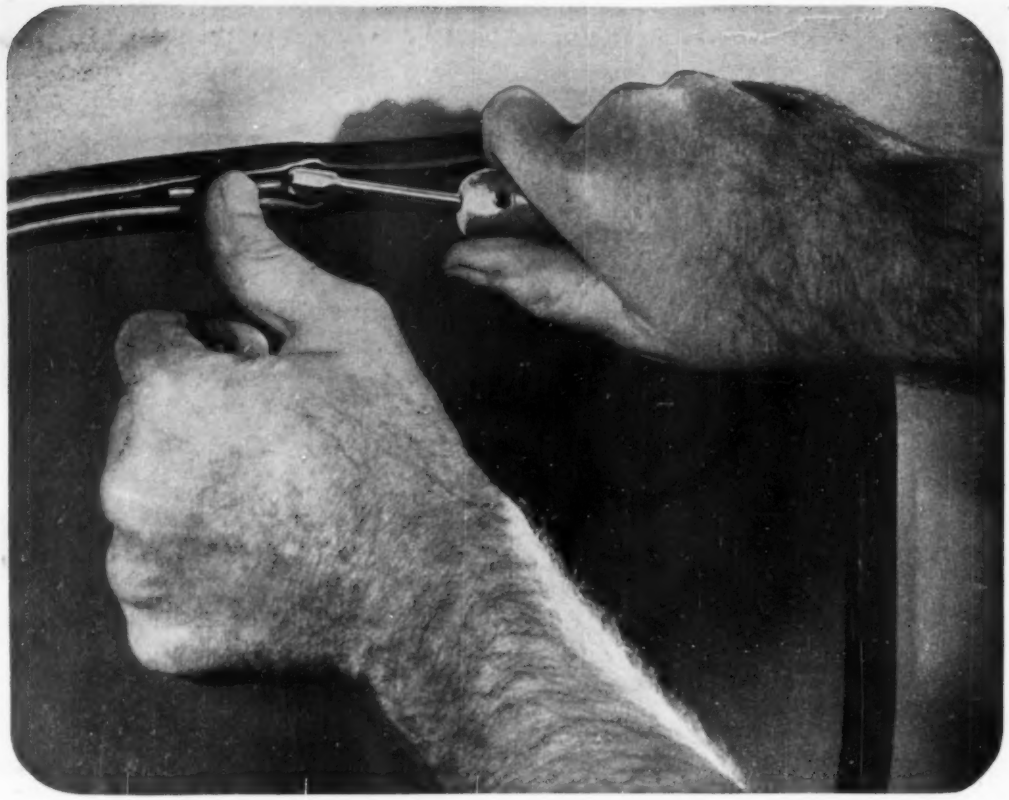
We manufacture the full range of AISI grades and special analysis steels as well as carbon steels.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation—Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM *ALLOY* STEELS

BETHLEHEM STEEL



THIS WINDOW WILL *NOT* BE A "LEAKER"!

Sure, that's a strong statement. But it's a fact for all permanent windows, and windshields, protected by Inland Self-Sealing Weather Strip. *They don't leak!*

Inland Strip uses no cement, clamps, rivets, screws or other artificial sealing methods. Inland Strip *itself* grips both glass and body panel with conforming rubber under such strong pressure that all leaks are *permanently prevented!*

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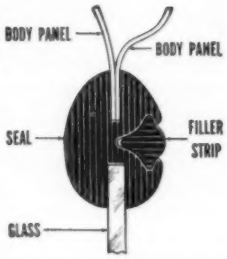
Design your vehicles to use Inland Self-Sealing Weather Strip. It's a powerful sales argument . . . with any prospective vehicle operator.

INLAND MANUFACTURING DIVISION
General Motors Corporation, Dayton, Ohio



Easy, Fast, Economical!

The seal goes into the body panel, the glass into the seal, and the filler strip into the locking channel. That's all . . . a fast, low-cost, one-man job . . . done once . . . for permanent weatherproofing!

INLAND MANUFACTURING ***Self-Sealing Weather Strip*** *(PATENTED)*

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another feature of Accurate service

A portion of the elaborate quality control equipment in use at Accurate.

. . . and it lowers
the overall cost of your springs

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The best way to find out what we mean is to give us a trial. For a quotation just send a drawing and specifications or, if you prefer, Accurate engineers will be pleased to give their assistance in developing new or improved design. ACCURATE SPRINGS MFG. CO., 3810 W. Lake St., Chicago 24, Illinois.

Write for your copy of the new revised Accurate Handbook of Technical Data on Springs. This booklet has been out of print for some time and if you have previously requested a copy and have not received it, we would appreciate your asking again.

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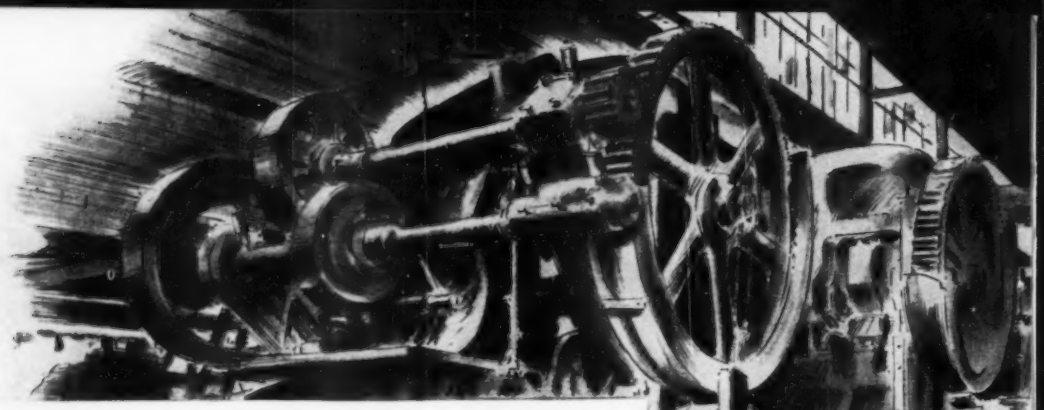
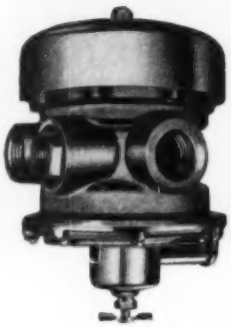


Announcing MIDLAND'S



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Exclusively Outmodes All Other Vacuum Valves

Maximum braking obtained in 1/3 the time • Increases efficiency of brakes on high speed stops and on steep down grades • Built-in emergency check valve—eliminates separate check valve—reduces installation cost • 25% lighter than total of units it replaces • So greatly advanced in design and operating features that it outmodes other vacuum valves • Write or phone for complete details.

ADVANCED DESIGN 4-in-1-Unit

1. Large capacity relay valve.
2. Contains built-in tank valve.
3. Contains open type trailer check valve.
4. Integral moisture trap and drain.

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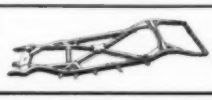

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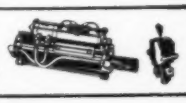

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to change THIS

On mountainous terrain of a major southern road, 16 4-unit Diesels now handle the tonnage formerly hauled by 100 of the road's heaviest steam locomotives.

to THIS

Dependable Fuel Injection

Diesel power was already *available* when most of the steam locomotives in use today were being built. But it was a sleeping giant. One vital element was necessary to make this efficient, economical source of power universally applicable — *dependable solid fuel injection equipment.*

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1. *Development and Field Engineering.*

American Bosch engineering departments and laboratories work constantly to improve existing products, develop new ones such as the revolutionary single plunger multi-cylinder PSB Pump. American Bosch field engineers work hand in hand with engine and equipment manufacturers — from original design to test models and actual field operation.

2. *Precision Manufacture.*

The knowledge and craftsmanship that made solid fuel injection a reality . . . plus engineering research, proven techniques, unparalleled production and testing facilities (many of them initiated and developed here) . . . insure uniform adherence to the highest standards of accuracy and performance.

3. *Service Organization.*

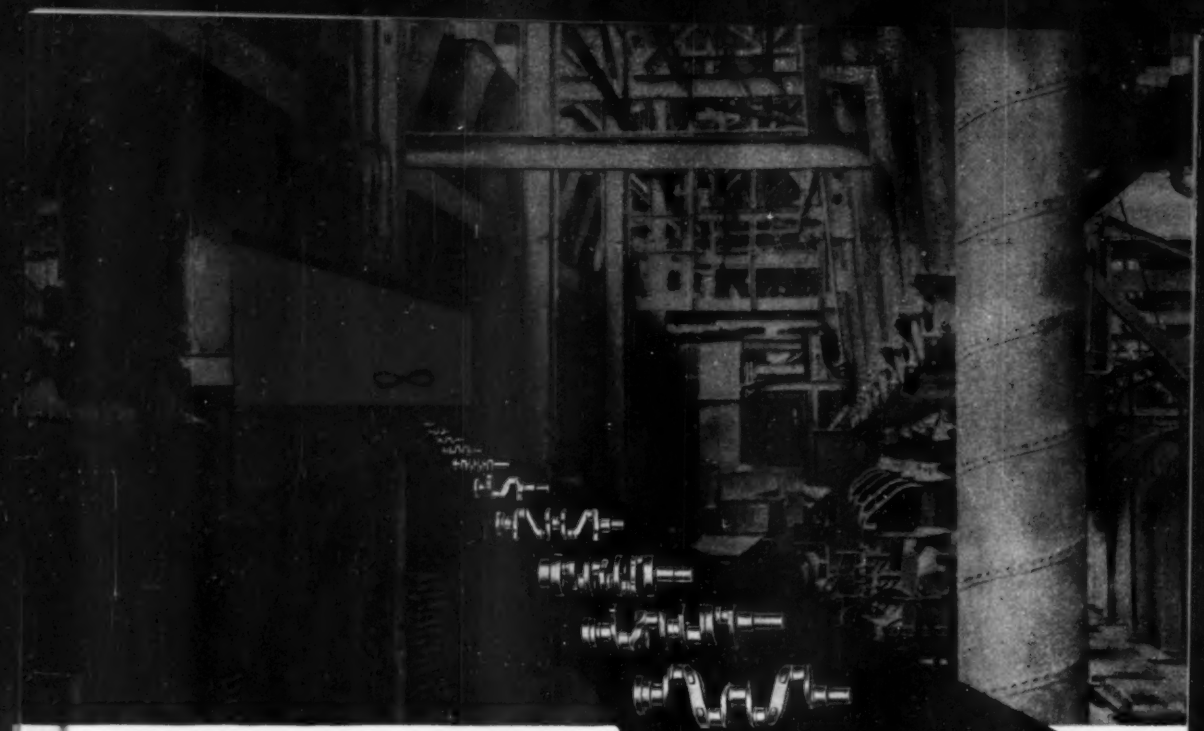
In many U.S. cities and at strategic points throughout the world, American Bosch maintains an ever-growing network of authorized service stations. Staffed by personnel trained to factory standards, with factory-designed and built testing equipment, they are prepared to render efficient and reliable service whenever needed.

American Bosch

Dependable Fuel Injection for the Diesel Industry

AMERICAN BOSCH CORPORATION, SPRINGFIELD 7, MASS.

Magnetos • Generators • Voltage Regulators • Ignition Coils • Electric Windshield Wipers • Diesel Fuel Injection Equipment



an infinite ∞ variety of design

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alloy steel crankshafts

With today's trend toward smaller and smaller engines, delivering more and still more power, engineers are faced with new and increasingly difficult crankshaft design problems. The answer in most cases can be found with Quality-Controlled AUSCO Cast Alloy Steel Crankshafts, which have practically no design limits. The performance of over 2,000,000 crankshafts, in daily operation, attests their many advantages for large-volume-production motor cars.

ASK US TO SUBMIT THIS BOOK OF EVIDENCE

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AUTO SPECIALTIES MFG. CO.
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AUSCO Cast Alloy Steel Crankshaft for a new High Compression V-8 Engine —difficult but with AUSCO Cast Alloy Steel, made commercially possible.

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MACHINING GREATLY REDUCED AND SIMPLIFIED

FREEDOM FROM WARPAGE DURING MACHINING AND IN OPERATION

IMPROVED ENGINE PERFORMANCE

by AUSCO

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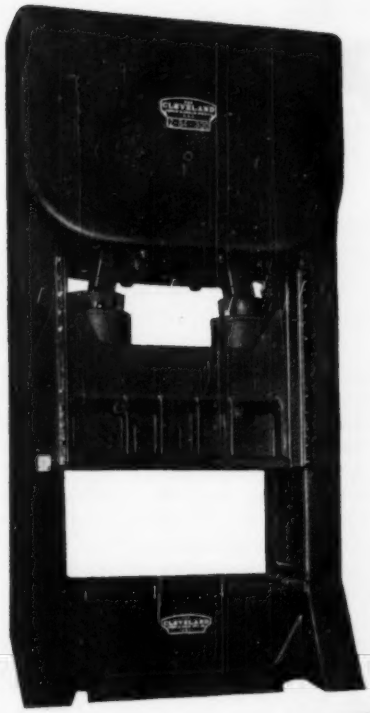
This Cleveland Two-Point is used by Advance Die and Tool Co. to check performance of a close tolerance die.

Don't take *OUR* word alone!



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We know that the clean, compact design of a Cleveland Press saves valuable floor space . . . that there are no bothersome overhanging brackets . . . that its rugged construction assures accuracy and longer die life.

We know that for safe, efficient, trouble-free operation you can't beat a Cleveland—but don't take our word alone!

Before you select your next Press—whether you are replacing one that is inefficient or adding to those you already have—let us arrange for you to study a Cleveland in actual operation at a nearby plant. Find out for yourself what operating economies you gain with a Cleveland. Constant accuracy . . . close control . . . easy maintenance . . . flexibility of use and ease of die change—contribute towards a Cleveland's record for true operating economy. Verify this yourself!

A-1612

Note the clean, rugged lines of this Cleveland Two-Point Press.

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HY-PRO Phillips Insert Bits & Bit Holders

(Patent Applied For)

On industry's assembly lines the new HY-PRO Phillips Insert Bits are averaging over 25% longer life than bits formerly used, and as much as double to *triple* the life on really tough driving jobs! A leading automotive manufacturer states that in recent tests, HY-PRO Phillips Insert Bits outwore bits currently in use by a margin of FOUR to ONE! Whether your Phillips screw driving operations involve simple hand driving or large volume power driving, these remarkable bits will effect drastic economies in time and cost.

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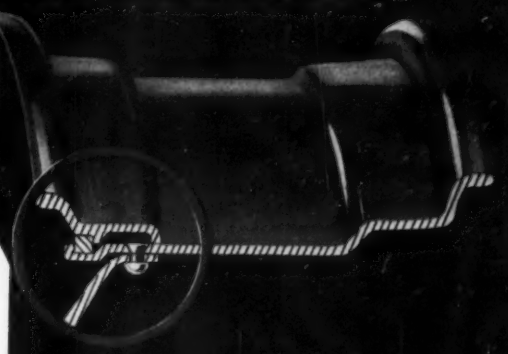
Advanced Design

3 pc. Truck Wheel



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Hailed by truck manufacturers and tire servicing men as the safest ever devised! As tire is inflated the retaining ring locks the assembly even tighter. Also assures greatest convenience in tire mounting, demounting, and tube insertion!

Available in all popular sizes for leading makes of trucks . . . to increase tire mileage 20% to 50%!

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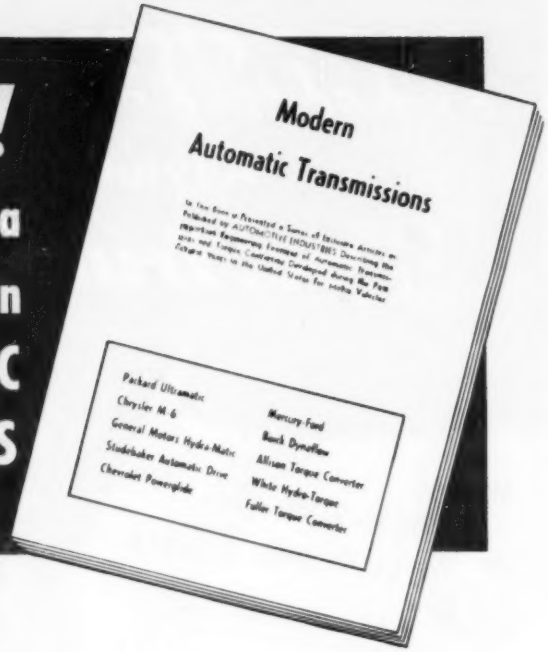

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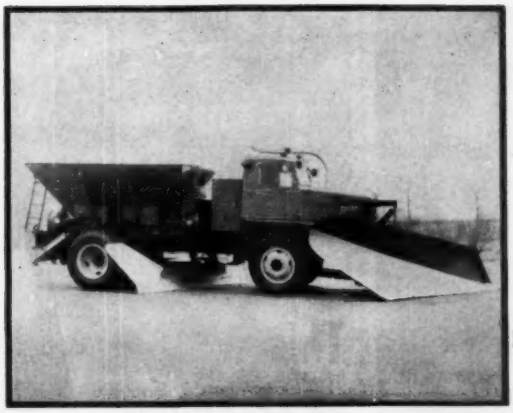


Where the going is tough the clutch must stand up. That's why these heavy-duty units choose Lipe Clutches.

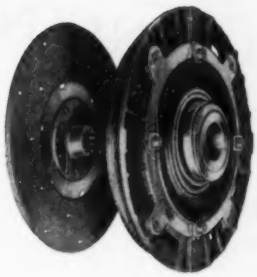
MORE ENGAGEMENTS BETWEEN TEARDOWNS

NO SHOCK! NO GRAB!
NO COCKED PLATES!

LIPE *MULTI-LEVER HEAVY DUTY* CLUTCH

The Lipe *multi-lever* Clutch *gives more engagements between teardowns.* There's no grab, no shock. Strain on engine and drive-line is reduced, tire mileage increased.

Here's the reason: *There's only one spring.* Spring pressure is distributed uniformly around the full 360° perimeter of the pressure plate by 20 pressure-equalizing levers. Every part of the pressure plate touches at the Same Instant . . . with the Same Pressure. *There's no cocking of the plate.* No areas of high-speed slippage and localized burning. Circulated air keeps internal temperatures low. The clutch engages smoothly . . . requires no babying . . . holds without slippage in final engagement . . . disengages with light pedal pressure.



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Fast, easy adjustment assures torque capacity for the full life of the friction material. No special tools required. Quick service on parts. Write for complete data on genuine Lipe parts stocked in principal cities.

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HI-EFF BALANCING

- *Fast*
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This 250-pound blower fan is being balanced to a 1 ounce inch on a HI-EFF Balancing Machine. The same Balancer is used for a wide variety of pieces up to 1200 pound size. It provides rapid balancing with accuracy indicated by the following tolerances:

Pieces weighing 500 to 1200 pounds, within 2 oz. inches.

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HI-EFF Balancing machines are available in 5 sizes with work piece diameters up to 48 inches. These may be equipped with HI-EFF Hand Weighing Mechanism (as shown) or HI-MAX Direct Reading Mechanism. Write for folder "Balance Your Product."

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it removes rust,
removes oil,
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OAKITE Compound No. 33 is a cleaning-phosphating material that simultaneously removes oil and rust and conditions the metal surface for painting.

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Oakite Compound No. 33 is a great soak cleaner for metal parts of moderate size; and great for hand-swabbing on large pieces like cabinets, desks, doors and truck cabs.

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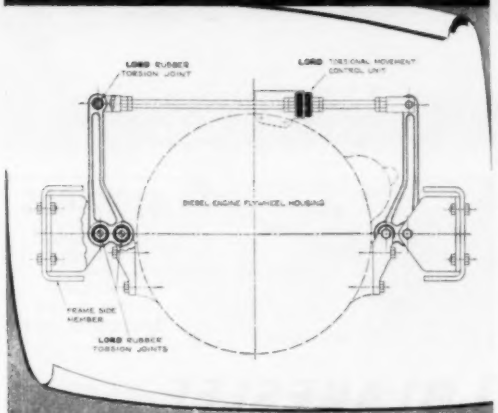
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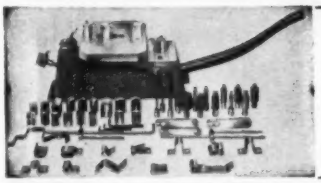

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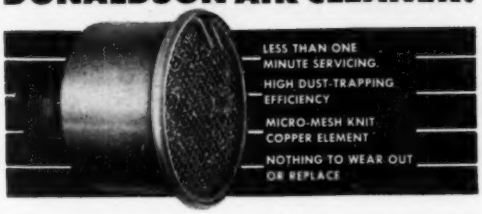
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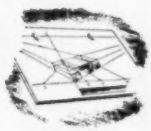

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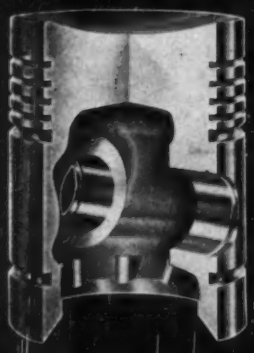

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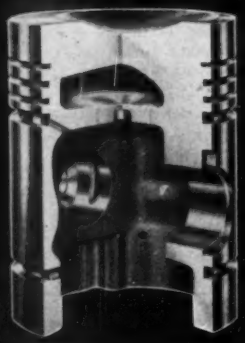

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ON THE WINNING CARS AT INDIANAPOLIS

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You'll find it will help you be sure of top value in the "vital zone" if you keep in mind this simple formula:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

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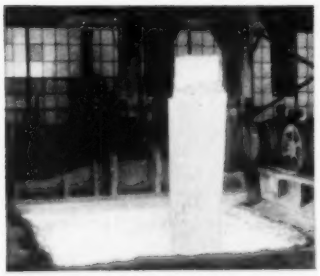
Over the years Timken has led in lowering prices. And in terms of value features, Timken prices are lowest today! The Timken Roller Bearing Company, Canton 6, Ohio.

How TIMKEN® gives you value where it counts most . . . in the "vital zone":



WE MAKE OUR OWN STEEL—because it is the only way we can get the consistently high quality steel required for Timken bearings. And because it gives us quality control from start to finish. Timken is the only bearing manufacturer in America that makes its own steel.

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3. Precision manufacture
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5. 50 years experience

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7. Unequalled research and development facilities for your use
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10. Most dependable source of supply

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11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's TIMKEN for VALUE

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